Texts for Consultation
Atmospheric Physics – Fall 2016

As you start to take more advanced Physics courses, it is quite likely you will want to go to sources beyond your textbook, instructor, and classmates to help you out. Getting help from the internet has become ubiquitous, but – as you probably are aware – using internet sources for help has its own dangers and pitfalls.

In an effort to help you find reliable sources for information, I am giving you this handout of texts that may aid your learning experience. Although asking Dr. Google is often easier than walking to the library, these sources have the advantage of being known, reliable resources.

Atmospheric Microphysics Texts

These texts are those that match most closely with the content of this year's PHYS 308 course.

- Pruppacher, H.R. and J.D. Klett (2010). *Microphysics of clouds and precipitation.* (2nd Ed.) Springer.

  This text has the most overlap of any with the content of our course. It is also an encyclopedic reference. It is comprehensive and an excellent reference. However, sometimes it reads more like a summary of recent journal results than a textbook. (Not necessarily a bad thing, but might be a bit less insightful than your typical physics text.) If you do get one book for this class, this wouldn't be a bad choice.

- Lamb, D. and J. Verlinde (2011). *Physics and Chemistry of Clouds.* Cambridge.

  I don't know nearly as much about this book as I should, since I've met both authors several times. I assume it is very well written and I hope to become more acquainted with it throughout this semester during our class. Looking at the table of contents, I'd say this text will likely become most useful to us in the second half of the semester.

- Rogers, R.R. and M.K. Yau (1989). *A Short Course in Cloud Physics.* (3rd Ed.) Butterworth-Heinemann.

  A very widely used book in Cloud Physics. I've found a few passages that I have some minor quibbles with, but I know many people use this as a central resource.

- Twomey, S. (1977). *Atmospheric Aerosols.* Elsevier.

  An absolute classic, but good luck finding a copy. One of the most valuable books I own. Extremely insightful, and much of our content associated with aerosols will be based on the treatment in this text.

General Atmospheric Resources

- Ahrens, C.D. (2008). *Meteorology Today.* (9th Ed.) Brooks-Cole.

  This is one of any number of introductory atmospheric science and/or meteorology texts that will help you with the basics. I am partial to this one because I've taught a course at the PHYS 105 level out of it before, but there are countless other introductory texts that are just as good. This gives you the very basics in a not-overly-mathematical way. Physics majors are likely to find the explanations a bit lacking, but that's what the rest of this document is for.

- Stull, R.B. (1999). *Meteorology for Scientists and Engineers.* Brooks-Cole.

  A good companion to the Ahrens text above. This goes into a bit more detail than the Ahrens.

- Wallace, J.M. and P.V. Hobbes (2006). *Atmospheric Science: An Introductory Survey* (2nd Ed.) Academic Press.

  This text was the one I used when I taught this course previously. Of course, in previous iterations, this course was a bit different – we were obligated to cover more content at a lower level, rather than diving seriously into elements of atmospheric microphysics. Since we're really seeking to understand atmospheric particulates in this course, this text is no longer an optimal choice. If you are going into atmospheric science, however, the Wallace and Hobbes is pretty much **the** standard text for an overview of all areas of atmospheric physics.

- Bohren, C.F. (2001). *Clouds in a Glass of Beer: Simple Experiments in Atmospheric Physics.* Dover.
- Bohren, C.F. (2006). *What Light Through Yonder Window Breaks?: More Experiments in Atmospheric Physics.* Dover.

  These are two real interesting books written at a level accessible to pretty much everyone. These books give an insightful way to address many of the central concepts relevant to this course, often coming from direct observation of everyday phenomena. They are also Dover books, so quite affordable.

General Atmospheric Physics Texts

This section identifies a bunch of texts that are similar in structure to the Wallace and Hobbes text (basic Atmospheric Physics texts). If none of the books associated with a particular sub-discipline in the following sections seem right to help you with your problem, these might be good places to check.

- Andrews, D.G. (2000). *An Introduction to Atmospheric Physics.* Cambridge University Press.

  I don't know much about this text; just listed first since I'm listing this section in alphabetical order by author.
- Houghton, J. (2002). *The Physics of Atmospheres.* 3rd Ed. Cambridge University Press.

  A relatively well-known book, but concentrates a bit more on larger-scale phenomena than we will be focusing on in our class.
- Salby, M.L. (1996). *Fundamentals of Atmospheric Physics.* Academic Press.

  Good book. Not sure what else to say. Similar in topics to the Houghton text, though sequencing is a bit different.
- Seinfeld, J.H. and S.N. Pandis (2006). *Atmospheric Chemistry and Physics: From Air Pollution to Climate Change* (2nd Ed.) Wiley-Interscience.

  Rather good book. When I need to look up something quick, this is usually one of the first books I grab. Well organized. Sometimes focuses on the Chemistry a bit more than the Physics. Good reference.

Sources for Insight on Special Topics

Since we're drilling down to pretty specific sources, I'll include these without comment. Most of these I find great resources.

Thermodynamics and Atmospheric Thermodynamics

- Baierlein, R. (1999). *Thermal Physics.* Cambridge University Press.
- Bohren, C.F. and B.A. Albrecht (1998). *Atmospheric Thermodynamics.* Oxford University Press.
- Petty, G.W. (2008). *A First Course in Atmospheric Thermodynamics.* Sundog Publishing.
- Schroeder, D.V. (1999). *Thermal Physics.* Addison-Wesley.

Radiative Transfer and Optics

- Bohren, C.F. and E. Clothiaux (2006). *Fundamentals of Atmospheric Radiation: An Introduction with 400 Problems.* Wiley-VCH
- Bohren, C.F. and D.R. Huffman (1983). *Absorption and Scattering of Light by Small Particles* Wiley-Interscience.
- Born, M. and E. Wolf (1999). *Principles of Optics* (7th expanded edition). Cambridge.
- Hecht, E. (2001). *Optics* (4th Ed.) Addison-Wesley
- Petty, G.W. (2006). *A First Course in Atmospheric Radiation* (2nd Ed.) Sundog Publishing.
- van de Hulst, H.C. (1981). *Light scattering by small particles* Dover.

Atmospheric Dynamics and Fluid Mechanics/Turbulence

- Batchelor, G.K. (2000). *An Introduction to Fluid Dynamics*. Cambridge University Press.
- Frisch, U. (1996). *Turbulence: The Legacy of A.N. Kolmogorov*. Cambridge University Press.
- Houze, R.A. (1994). *Cloud Dynamics*. Academic Press.
- Landau, L.D. and E.M. Lifshitz (1959). *Fluid Mechanics*. Addison-Wesley.
- Tennekes, H. and J.L. Lumley (1972). *A First Course in Turbulence*. MIT Press

RADAR

- Bringi, V.N. and V. Chandrasekar (2005). *Polarimetric Doppler Weather Radar: Principles and Applications*. Cambridge University Press.
- Doviak, R.J. and D.S. Zrnic (2006). *Doppler Radar and Weather Observations*. (2nd Ed.) Dover.
- Rinehart, R.E. (2004). *Radar for Meteorologists*. (4th Ed.) (Self-published, I think).