ESR 320
ENVIRONMENTAL SYSTEMS I
THINGS TO KNOW FOR THE FINAL EXAM
As before, OPEN NOTES/READINGS. Don’t memorize details but know exactly where to find them.

Calculations you should be ready for:

Be able to do basic calculations with radiative and evaporative heat transfer equations. For example, if you know the temperature of an object, you should be able to calculate its radiative output via the Stefan-Boltzmann Law. Conversely, if you are given the radiative heat flux from an object, be able to calculate the temperature. If it’s calculation you did for the radiation Lab, it’s fair game for the final exam.

If you are given an evaporation rate, you should be able to calculate the associated heat flux. (Multiply the mass loss via evaporation times the latent heat of vaporization.)

Be able to calculate solar angle if I give you sufficient information about declination, latitude, and the hour angle.

If I give you a set of conditions about a heat balance but with one term missing, be able to compute the missing term from a heat-balance set up. (For example, I might give you the conductive heat loss, evaporative heat loss, and the net longwave heat loss and then ask you to calculate what the shortwave input of heat must be.)

Be able to calculate the value of the Coriolis Factor, \( f = 2\omega \sin \Phi \) for a given latitude \( \Phi \). (\( \omega \), the frequency of the rotation of the earth was discussed in class; see notes for value and also shown in the Practice Problems on the website.)

Be able to calculate the magnitude of the Coriolis acceleration. (See practice probs)

Be able to calculate the acceleration due to a pressure gradient (See practice probs)

Be able to balance pressure acceleration with Coriolis Acceleration (See practice probs)

Other (non-calculation) things to know:

Know the basic vocabulary and terminology associated with radiative heat fluxes and the heat budgets of lakes and streams.

Know the basic vocabulary and terminology associated with a circulation of air on earth (for example, Hadley cells) as well as the Coriolis effect and ocean currents. Know things like cyclone vs. anticyclone; cum sole vs. contra solem upwelling, downwelling.

Know the factors that influence solar angle. These include both the “astronomical” factors of declination, latitude and hour angle, but also the factors contributed by topography and local terrain.

Know the main factors that influence wind patterns and ocean on the surface of the earth.

Know what wind and Coriolis conditions induce upwelling and which induce downwelling.