Lecture final exam
100 points possible

When and how to submit your take-home final exam: Please type out your responses to these questions, print it, and turn everything into the Geosciences Department office no later than 5pm on Thursday, May 25th. You should have one of the office staff members date/time stamp your submission and place it in my mailbox. You may e-mail me your responses as a means to date/time stamp your submission, but please also print it out and get a copy in my mailbox. You should aim to turn your exam in BEFORE 5pm on the due date to ensure that office staff are available and the office is open for you to submit your work.

This exam is open-book/open source, but all your responses MUST BE IN YOUR OWN WORDS and not direct quotes or even paraphrased excerpts from your text or material found online, etc. This exam is meant to take the same amount of time as a regular, in-class final exam — 3 hours. There are three questions below, so estimate that you should spend about one hour working on your response to each of these questions (this means I want very thorough responses). The responses you submit to me should be no more than one-page in length, single-spaced, with one inch margins, 12 point type (11 point type is OK if you need to squeeze in those last few words…), and Times font (or similar). Your response may be shorter, but be sure that it is thorough.

Question 1: How do you generate andesite at volcanic arcs? Describe what an andesite is (its chemistry/mineralogy), how and from what is the melt generated, the physical (petrologic/tectonic) and chemical processes that result in andesite, and the tectonic environments where andesite is likely to be found and why. Include a discussion of the effects of heat, pressure, and fluids on melting.

Question 2: Describe the Franciscan Complex — Discuss the petrology of the Franciscan Complex, the tectonic environment in which it formed, and pressure-temperature-time paths that Franciscan rocks followed. Be sure to include a discussion of the protoliths to the rocks found within the Franciscan, and a discussion of what a tectonic mélange is. Where else would you look in the world to find rocks similar to the Franciscan and why?

Question 3: Describe a suite of volcanic rocks from the Crater Lake area — Assuming that these volcanic rocks were all generated from the same parent magma body, explain the variation of major and minor elements versus silica shown in the diagram on the back of this sheet. Use Bowen’s reaction series to explain the physical and chemical processes involved in generating the variation in volcanic rock compositions. Include a description of the volcanic rock types found at Crater Lake (i.e., use the chemical data to name the rocks from the lowest silica to highest silica contents including at least one intermediate composition). Do you expect to find rocks of these compositions at a place like Crater Lake? Why?