

ESS-306 Learning Goals Set #1 / Midterm #1 Review Topics – Version #3***\*Changes from Version 2 indicated with red text (additions) or strike-through (deletions)***

1. Imagers vs. Spectrometers: how they differ and different kinds of information they provide
2. Active vs. Passive methods of remote-sensing
3. How to measure planetary surface temperature from orbit
4. How to generally interpret radar images of planetary surfaces, and how the particular wavelength of radar used affects what you can see and your interpretation
5. Impact hypothesis for the formation of Earth's moon, **and observations that support it**
6. History of the variation in the rate of crater-making impacts in the inner solar system
7. Formation processes of lunar highlands and mare, **and how they relate to their differing composition**
8. Formation and properties of lunar regolith **(more detailed sub-topics added below)**
  - a. **Space weathering processes and their effects (on the surface layer of airless bodies)**
  - b. **Lunar Regolith: Two types of glassy regolith particles and how they form**
  - c. **Lunar Regolith: How the grain size distribution of near-surface regolith (upper few meters) evolves over time, and the process(es) that control it**
  - d. **Lunar Regolith: How the physical properties of the regolith vary with depth, methods used to determine them, and processes that create them.**
9. Crater morphology variation with size **(simple, complex, depth-to-diameter ratio)**
10. Differences between impact craters and volcanic craters (calderas)
11. **Evidence for volcanism on the Moon and Mercury**
12. Which planets in the inner solar system have internally generated global magnetic fields and what is the current understanding of how they are generated
13. **Tectonic evidence for global contraction of Mercury's lithosphere, AND proposed explanation for the cause and magnitude of the contraction.**
- ~~14. Reasons for, and evidence for, ice in polar regions of the Moon and Mercury~~
15. **Global fault pattern (type, location and orientation) that would provide tectonic evidence for Mercury spinning faster in the past**
16. Local and distant effects of the Caloris impact on Mercury
17. Possible reasons for the different evolutionary paths of the atmospheres of Venus, Earth, and Mars - their differing atmospheric mass, composition and temperature
18. Causes and mechanism of the "greenhouse" effect
19. Similarities and differences in global topography (range & pattern) of Venus, Earth, & Mars
20. Hypothesis, and supporting evidence, for coronae formation on Venus
21. Implications of the observed crater distribution on Venus

- ~~22. Seasonal cycle of CO<sub>2</sub> ice on Mars~~
- ~~23. Characteristics and possible cause of the polar layered deposits on Mars~~
24. Evidence for subsurface water ice on Mars
25. Characteristics and possible cause(s) of Martian gullies
26. How we know some meteorites came from Mars, and what they tell us about that planet
27. Possible reasons for the enormous size of some Martian volcanoes
28. How atmospheric processes affect the appearance and shape of the Martian surface
29. Characteristics of the ancient (Noachian) valley networks on Mars and their significance/implications for past climate
30. Hypothesis for the formation of the giant outflow channels on Mars, and its relationship to the geomorphology of the source and sink regions and the channels themselves