Name ______________________________

Soils & Vegetation Final Exam - Fall 2015

Possible Exam Question

For the final exam I will choose 12 questions you will answer.

The final exam is scheduled for December 21st from 1:45 to 3:45pm in room 1022.

1. How do plants in tundra differ from plants in other biomes in terms of size, growth form, and contribution to belowground systems? What specific environmental constraints are organisms in this environment exposed to, and how does their form and function allow them to survive in this area?

2. What is the advantage of the C4 photosynthetic pathway as compared to the conventional C3 pathway? How might these advantages influence where these plant species are found?

3. How does diffusion control the uptake of carbon dioxide and the loss of water from a leaf?

4. How does the availability of water to a plant constrain the rate of photosynthesis?

5. Define and characterize the following processes in the nitrogen cycle:
   a. fixation
   b. ammonification
   c. nitrification
   d. denitrification

6. Explain why the soils of rain forests are poor for agriculture.

7. What is the advantage of a lower light compensation point (LCP) for plant species adapted to low-light environments? What is the cost of maintaining a low LCP?

8. Compare and contrast net primary productivity and standing biomass for an ecosystem.

9. What are the two major food chains and how are they related?

10. How does the type of carbon compounds present in dead organic matter influence its quality as an energy source for decomposers?

11. How does lignin concentration influence the decomposition of plant litter?

12. How are the processes of photosynthesis and decomposition involved in the carbon cycle?

13. In the temperate zone, is the concentration of carbon dioxide higher during the day or night? Why?

14. What are the major strata in the tropical rainforest? Discuss how the strata affect transmission of PAR to ground level.

15. What distinguishes savannas from grassland ecosystems? Discuss the differences in structure and climate between tropical savannas and deserts.
16. What types of leaves characterize the trees of the following ecosystems and why?
   a. Mediterranean
   b. temperate forests
17. What is permafrost and how does it influence the structure and productivity of boreal forest ecosystems?
18. Last winter I covered 50% of my garden soil with a 10 cm (4 inch) layer of organic matter compost while the remaining 50% remained bare. Following a light snowfall, I observed that one half of my garden was snow free while the other half had a layer of snow. Which side of the garden had snow (bare or composted)? Explain why this difference occurred.
19. What are three ways that light colored, organic mulch like dried grass clippings or sawdust influences soil temperature when placed on the soil surface? Briefly explain the concept behind each effect.
20. A total of 20 cm of irrigation water was added to the clay loam and sandy loam profiles. Assume that both soils were dry (0% water) before addition of water and that no water is lost from the bottom of the soil profiles.
   a. Draw a line that shows the relative position of the wetting front (i.e., depth of water) after 30 minutes (Assume that water is still entering each soil at this time).
   b. Draw a second line that shows the relative position of the wetting front after 24 hours. (Assume that the water has reached its equilibrium position at this time).
   c. For both times, indicate why you chose to draw the line where you did.
21. Define soil fertility and explain why cation exchange capacity (CEC) is integral to the maintenance of soil fertility.
22. Explain why the opening of stomata has both benefits and costs for plants in dry environments.
23. Describe two plant adaptations to low light and explain why these adaptations are unsuitable for plants in high light environments.
24. Define the term rhizosphere and explain the importance of roots, decomposers, and microbial grazers in the soil microbial loop.
25. You are growing tomatoes on two different soil types:
   A = Sandy Loam        B = Clay Loam
   In the following questions, explain in detail why you chose your answer.
   a) Which soil will require more frequent irrigation?
   b) Which soil will contain the most plant available water in the rooting zone?
   c) Which soil will have a greater concentration of soil organic matter?
   d) Which soil will have a lower cation exchange capacity and thus require more fertilizer additions?
   e) Which soil will tend to have the poorer aeration?