**Laboratory Learning Outcomes and Objectives**

**Laboratory 4: BOTANY PART 1: KINGDOM PLANTAE – SEEDLESS PLANTS: BRYOPHYTES, FERNS**

*After completion of this laboratory session, and with 70% accuracy on the first laboratory quiz, the student should be able to:*

1. Describe the characteristic features of Kingdom Plantae and their adaptations to land
2. Understand the alternation of generations and 4 groups of plants
3. Describe the life histories and related reproductive structures of mosses and liverworts
4. Discuss similarities and differences between ferns and bryophytes
5. Describe the life cycles of ferns and their allies
6. Answer the review questions at the end of the exercises

***Remarks:***

***- Lycopodium (club moss) spores will be provided. These spores, used to create “dragon fire” and other effects, are highly hydrophobic. This can be demonstrated by pouring them on a beaker filled with water to create a homogenous layer on the surface. Then, the instructor, and then students, can dip a finger in the beaker and observe its dryness. This demonstration should be used as a starting point to discuss the role of spores in the life cycle of plants and reinforce their differences with seeds/sperm.***

***- Monocoats and dicots should be prepared for following week: seeds are placed on soaked paper in Petri dishes***