

**FALL 2008**

**BIO 340 001/200**

**PLANT PHYSIOLOGY**

Michael J. Durako 962-2373 [durakom@uncw.edu](mailto:durakom@uncw.edu)

Lecture: Mon. & Wed., 5:00-6:15 **DO 226**

Lab: Thur., 2:00-4:50pm **DO 104**

Office hrs: Mon.: 4-5:00, Thur.: 11-12:30 **FR 1002A** 962-2676

This course will focus on plant structure and function at the molecular, cellular, and organismal levels. Emphasis will be placed on terrestrial vascular plants, but will include some discussion on submerged vascular plants and marine algae. The laboratory will largely use a plant tissue culture approach to illustrate aspects of plant development and responses to environmental factors. Students will gain a knowledge and proficiency on the use of tissue culture techniques in plant propagation.

Text: Plant Physiology, 4th Edition, L. Taiz and E. Zeiger, Sinauer Assoc. 2006

WebSite: [www.plantphys.net](http://www.plantphys.net)

Materials: Notebook for lab data and observations

Evaluation: A=90-100, B=80-89, C=65-79, D=50-64, F=0-49

1. 75% Lecture Exams (3)
2. 25% Lab Attendance and Report (see below)

The Lab portion of this course is worth 25% of the course grade. Attendance is required for the labs. You will be part of a lab team that is responsible for plant manipulations, measurements, plant production, and data analyses and your absence will require the other members of your team to perform extra work. For every unexcused absence your grade will be reduced by 5%. 80% of your lab grade comes from your final report which you will submit at the end of the semester. This report will describe the results and significance of your tissue culture experiments (see details below). There will also be 4 small reports on the Water Potential, Nutrient deficiency, Photosynthesis, and Fluorescence labs which are worth 5% each or 20% of your lab grade. Each of these small reports will have data to graph and some explanation of the results.

#### FINAL LAB REPORT

This report includes all your data except the special experiments (8-12 pages, not including figures, tables and references).

You are asked to write a new chapter for your textbook, *Plant Physiology*. It will be Chapter 27, and the title will be *Plant Tissue Culture and its Applications*. Using your data and references from the scientific literature (at least 5) you must write this new chapter. The last section should be on *Applications*, or on *Uses in Teaching*. Follow the internal reference style and reference list style of your textbook. Also, use subheadings as does your textbook to help organize the information into sections.

You will integrate your experimental information with other papers and books on tissue culture. This should be a comprehensive chapter in which you review the importance of plant tissue culture, different methods, potential results and discussion. It is in the area of potential results that you will have the chance to bring your class data into the report. For example, consider the following description of micropropagation that might be in your report:

"While in vitro propagation often proceeds through axillary branch cultures (see Section 23.X) or nodal culture, some plants can show enormous regeneration potential using adventitious growth. Cultures of the *Hosta* produced multiple plantlets from stem-base explants at a frequency of 85% (Class Data, 2008). Other authors report even more dramatic increases in plantlet production from similar explants of yellow onion (Lucky-Botanist, 1998). A number of horticulture species also show this capacity for propagation using adventitious production of new plants under in vitro culture. Greenthumb (1999) describes a system for multiple production of *Myriophyllum spicatum* (Parrot feather) using stem internode sections laid perpendicularly on the medium."

### Possible Outline

#### Introduction

- Importance of Tissue Culture

#### Requirements for Tissue Culture

- Media

- Plant Growth Regulators

- Surface Sterilization

#### Types of Tissue Culture

- Organogenesis

  - your example is tobacco

- Adventitious Growth

  - your example is *Myriophyllum* (parrot feather )

- Micropropagation with axillary buds

  - your example is rose

- Micropropagation of basal shoots and leaf tissues

  - your examples are *Hosta* and Venus Fly Trap

- Rooting Cultures

  - your examples are rose, *Hosta*, and Venus Flytrap

- Acclimation of cultures to outdoor conditions

  - your examples are rose, *Hosta*, and Venus Flytrap

#### Uses of Tissue Culture

  - examples might include biotechnology, nursery propagation, revegetation, bioassay, etc.

#### Literature Cited