PLS 597 – Advanced Crop Physiology and Breeding

Fall Semester 2012, TAMU-Commerce

Credit Hours: 3 (3 h lecture).
Lecture Meets: Monday 5:15 pm to 8:45 pm in AGIT 255
Prerequisites: PLS 115 and CHEM 108 or 211 (or equivalent)
Instructor: Dr. Jim Heitholt (Jim_Heitholt@tamu-commerce.edu)
Office: Ag 135
Phones: 903-886-5351
Office Hours: Friday after 10 am or by appointment

A. Course description:

The first set of lectures will cover physiological processes underlying crop growth and development. The second set of lectures will cover principles of breeding self-pollinated, cross-pollinated, and vegetatively (asexually) propagated plants. The effect of crop management practices on physiology will be discussed.

B. Objectives:

1. To develop an understanding of basic plant biochemical and physiological systems.
2. To understand principles used to create higher yielding crops as well as crop cultivars with better resistance to insect pests and pathogens.
3. To relate crop production and management practices with basic physiological mechanisms and to understand genotype-by-environment interactions.

C. Course outline:

1. Plant cells and tissues, plant parts (particularly flowers), structure, and function
2. Biochemical role of membranes
3. Photosynthesis, respiration
4. Water and mineral nutrition
5. Plant transport, plant hormones
6. Light, temperature, and photoperiod
7. Plant protection
8 Basic physiology and plant management
9. Principles of Plant Genetics, Mendelian Inheritance, G × E
10. Quantitative Inheritance
11. Pedigree, Bulk Population, Single Seed Descent, Backcrossing
12. Heterosis
13. Breeding for Resistance to Insects and Disease
14. Plant Variety Protection, Novel Approaches to Breeding

D. Student Learning Outcomes

A. The student will be able to describe the differences between C3 and C4 photosynthesis.
B. The student will be able to draw a graph depicting G × E interaction.
C. The student will be able to distinguish between pedigree and single seed descent breeding.

E. Evaluation

Two take-home tests, one in-class (all 100 points each), one 100-point independent project. Attendance and active participation in class is expected. Conventional 90% A, 80% B, 70% C, etc., will be used.

F. Reference Materials:

1. Handouts
2. Introduction to Plant Physiology, 3rd edition (Hopkins and Hüner, 2009)
3. Physiological Basis of Crop Growth and Development, (Tesar, 1984)
4. Principles and Procedures of Plant Breeding: Biotechnological and Conventional Approaches, (Chahal and Gosal, 2002)
5. Principles of Plant Genetics and Breeding, (Acquaah, 2007)

G. Students with Disabilities:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Halladay Student Services Building
Room 303 A/D
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
StudentDisabilityServices@tamu-commerce.edu

G. Civility Statement – Professionalism

Students are expected to attend class and/or laboratory as scheduled. Their participation in class discussion and instructional activities should follow the basic principles of common courtesy, decency, and cooperation with peers and instructional personnel. Rude and disruptive behavior, as well as cheating, in any form, will not be tolerated. The use of tobacco products in the classroom, laboratory, or field trip sites is prohibited. Inappropriate conduct will not be tolerated. Failure to comply with instructor's guidelines may result in suspension from class for the remainder of the day's instruction. Repeat offenses may result in additional consequences.

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H. Academic Honesty and Integrity

Students are expected to do their own work. Assistance with written assignments, such as proofreading or editing, is encouraged as long as the final concepts and product are those drafted and authored by the student. Information or materials (including ideas, quotes, data, procedures, etc.) from sources other than the student must be given proper credit through appropriate citation. The discipline of Agricultural Education uses the APA format (5th edition) as its primary style guide for publications, including research papers and reports. Assistance with this format and general guidelines for written assignments are available at the following two sources:

The Online Writing Lab at Purdue University
http://owl.english.purdue.edu/owl/resource/560/01/
The Writing Center @ TAMU-Commerce
http://www.tamu-commerce.edu/litlang/CSC/index.htm

Academic honesty and integrity is expected of all students. Cheating including but not limited to copying, talking to classmates during testing, using notes when prohibited by instructor, and plagiarism (as defined by the Council of Writing Program Administrators http://www.wpacouncil.org/node/9) will not be tolerated. Penalties may include grade reduction or suspension from class, depending on the frequency and severity of the violation.