**COURSE SYLLABUS**

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>Course Title</th>
<th>Credits</th>
<th>Clock Hours Per Week: 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOT 2313</td>
<td>Plant Anatomy and Development</td>
<td>3</td>
<td>Lecture 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Laboratory 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Demonstration (Yes)</td>
</tr>
</tbody>
</table>

**Department:** Biology  
**Prerequisites:** BSC 1010, BSC 1011

**College:** Arts and Sciences

**Required Textbook(s):** Biology of Plants (7th ed) by Raven, Evert, Eichhorn (2005), Publ: WH Freeman

**Faculty Name:** Dr. Gokhan Hacisalihoglu  
**gokhan.h@famu.edu**  
**Term and Year:** Fall 2010

**Office Location:** 114 FSH Science Research Center  
**Campus Telephone:** 599-3665

**Office Hours (Others by Appointment):**
- Monday: 11-12.30
- Tuesday: 3.30-5.30
- Wednesday: 11-12.30
- Thursday
- Friday
- Saturday

**Course Description**
A lecture and laboratory course on the structure and development of the vegetative organs and tissues of vascular plants. This course is designed to give students a working knowledge of the structure of vascular plants and to apply this knowledge to new situations. To accomplish this, students will be required to take lecture and laboratory sections in the same semester. Furthermore, emphasis on examinations will require students to synthesize information from lectures and laboratory.

**Course Purpose**
The overall goal of the class is to provide teachers with:
- the understanding of the principles of plant anatomy.
- Structure and development of cells, tissues and tissue systems with emphasis on flowering plants; comparative anatomy of stem, root, leaf and flowers.
- to relate the plant anatomy to plant physiology; and to examine how this information is used in modern research.

**Conceptual Framework**
The Conceptual Framework in the Professional Education Unit (PEU) at Florida A&M University is an integrated approach to providing educational experiences that result in exemplary professional educators. The Framework is comprised of six themes with the mission of developing high quality classroom teachers, administrators and support personnel. The term "exemplary" refers to the kind of graduates the PEU strives to produce. The figure below provides a diagram of the Exemplary Professional Conceptual Framework:

F=Florida Educator Accomplished Practices Standards (FEAPS)  
I=Interstate New Teacher Assessment and Support Consortium Standards (INTASC)  
(K)=Knowledge  (S)=Skill  (D)=Disposition

Approved/Revised 10/30/07
### TECHNOLOGY

**• CF 2**

**• Through this focal area, the FAMU professional education candidate will:**

| CF: 2.1 (S) | Use of available technology and software to support student learning. | F: 12 | I: 6 |
| CF: 2.3 (K) | Know fundamental concepts in technology. | F: 12 | I: 1,6 |
| CF: 2.4 (K) | Understand fundamental concepts in technology. | F: 2,12 | I: 6 |
| CF: 2.5 (S) | Use fundamental concepts in technology. | F: 12 | I: 6 |
| CF: 2.6 (S,D) | Facilitate access to technology for students. | F: 12 | I: 6 |
| CF: 2.7 (S) | Facilitate the use of technology by students. | F: 4,12 | I: 6 |

### CRITICAL THINKING

**• CF 4**

**• Through this focal area, the FAMU professional education candidate will:**

| CF: 4.1 (K) | Understand a variety of instructional/professional strategies to encourage student development of critical thinking and performance. | F: 4,7 | I: 4 |
| CF: 4.2 (S) | Use a variety of instructional/professional strategies to encourage students' development of critical thinking and performance. | F: 2,7 | I: 4 |
| CF: 4.3 (D) | Value critical thinking and self-directed learning as habits of mind. | F: 4 | I: 1,4 |
| CF: 4.4 (K) | Acquire performance assessment techniques and strategies that measure higher order thinking skills of student. | F: 1,4 | I: 1,8 |
| CF: 4.5 (S) | Demonstrate the use of higher order thinking skills. | F: 8 | I: 4 |

### URBAN/RURAL EDUCATION

**• CF 6**

**• Through this focal area, the FAMU professional education candidate will:**

| CF: 6.4 (S) | Communicate effectively with students' parents and the community. | F: 5,11 | I: 6 |

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(D)=Disposition

Approved/Revised 10/30/07
Specific Behavioral Objectives

1. Identify plant survival strategies:
   a) Identify the raw materials and products of C-3 photosynthesis, including the Calvin cycle, light dependent and light independent reactions, and factors that affect their rate
   b) Identify the raw materials and products of C3 photosynthesis, as well as factors that affect the rate of light-dependent reactions and the Calvin cycle.
   c) Identify key differences between C3, C4, and CAM photosynthesis, and the evolutionary and ecological significance of these pathways.

2. Become familiar with the chemical basis of photosynthesis
   a) Analyze the role of chemiosmosis in photosynthesis and respiration.
   b) Compare chemosynthetic and photosynthetic processes and the roles of organisms using these processes in the ecosystem.
   c) Compare the mechanisms and results of nuclear division (Karyokinesis) and cell division (cytokinesis) in plant and animal cells.
   d) Analyze the processes and products of meiosis in plants, animals, and fungi.

3. Become familiar with the differences between different types of plants and their effects on other living things:
   a) Identify major types of plants.
   b) Identify the positive and negative effects of protists, fungi, and plants on other living things.
   c) Relate the structures of specialized plant tissues to their functions.
   d) Relate the characteristics of vascular and nonvascular plants to adaptations allowing these organisms to broaden their ecological niches.
   e) Identify the functions of the major organs of angiosperms and gymnosperms and the survival advantages associated with those organs.
   f) Compare the structures of monocots and dicots (e.g., seeds, vascular bundles, venation, flower parts).
   g) Relate the major mechanisms (e.g., transport, storage, water conservation, reproduction, transpiration) in plants to environmental stimuli.
   h) Analyze the role of major plant growth regulators (e.g., auxins, gibberellins, ethylene).
   i) Identify methods of reproduction in plants.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Behavioral objectives</th>
<th>INTASC Standards</th>
<th>FEAPs</th>
<th>FTCE SAE</th>
<th>PEU Conceptual Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture Exam 1</td>
<td>Identify plant survival strategies:</td>
<td>I: 4, 6, 8</td>
<td>FEAPs: 4.1:b,4,c,4.g,4.j, 5,1, 8,1:8.b,8.c,8.f, 11.1, 12.1:12.b,12.c,12.l, 12.j:12.k,12.l</td>
<td>FTCE: 1.1, 1.4, 1.10, 3.4, 3.6, 3.7, 3.8, 3.12, 3.15, 4.5, 4.8, 5.8, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10</td>
<td>CF: 2.1, 2.3, 2.4, 2.5, 2.6, 2.7, 4.1, 4.2, 4.3, 4.4, 4.5</td>
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<tr>
<td>Project 1. Final Science Paper</td>
<td>Become familiar with the chemical basis of photosynthesis</td>
<td>I: 4, 6, 8</td>
<td>FEAPs: 4.1:b,4.c,4.g,4.j, 5,1, 8,1:8.b,8.c,8.f, 11.1, 12.1:12.b,12.c,12.l, 12.j:12.k,12.l</td>
<td>FTCE: 1.1, 1.4, 1.10, 3.4, 3.6, 3.7, 3.8, 3.12, 3.15, 4.5, 4.8, 5.8, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10</td>
<td>CF: 2.1, 2.3, 2.4, 2.5, 2.6, 2.7, 4.1, 4.2, 4.3, 4.4, 4.5</td>
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<tr>
<td>Final Comprehensive Exam</td>
<td>Become familiar with the differences between different types of plants and their effects on other living things</td>
<td>I: 4, 6, 8</td>
<td>FEAPs: 4.1:b,4.c,4.g,4.j, 5,1, 8,1:8.b,8.c,8.f, 11.1, 12.1:12.b,12.c,12.l, 12.j:12.k,12.l</td>
<td>FTCE: 1.1, 1.4, 1.10, 3.4, 3.6, 3.7, 3.8, 3.12, 3.15, 4.5, 4.8, 5.8, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10</td>
<td>CF: 2.1, 2.3, 2.4, 2.5, 2.6, 2.7, 4.1, 4.2, 4.3, 4.4, 4.5</td>
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</table>

F=Florida Educator Accomplished Practices Standards (FEAPS)
I=Interstate New Teacher Assessment and Support Consortium Standards (INTASC)
(K)=Knowledge (S)=Skill (D)=Disposition

Approved/Revised 10/30/07
National and State Standards Addressed in the Course

Interstate New Teacher Assessment and Support Consortium (INTASC) Standards

Standard 1: Subject Matter:
The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

Standard 4: Instructional Strategies
The teacher understands and uses a variety of instructional strategies to encourage students’ development of critical thinking, problem solving, and performance skills.

Standard 6: Communication
The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom. Standard .

Standard 8: Assessment
The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner.

Florida Educator Accomplished Practices (FEAPs)

1. **CRITICAL THINKING**
   4.1 The preprofessional teacher is acquiring performance assessment techniques and strategies that measure higher order thinking skills in students and is building a repertoire of realistic projects and problem-solving activities designed to assist all students in demonstrating their ability to think creatively.

4.PRE.b Identifies strategies, materials, and technologies that she/he will use to expand students’ thinking abilities.

4.PRE.c Has strategies for utilizing discussions, group interactions, and writing to encourage student problem solving.

4.PRE.g Demonstrates and models the use of higher-order thinking abilities.

4.PRE.j Uses technology and other appropriate tools in the learning environment.

8. **KNOWLEDGE OF SUBJECT MATTER**
   8.1 The preprofessional teacher has a basic understanding of the subject field and is beginning to understand that the subject is linked to other disciplines and can be applied to real-world integrated settings. The teacher’s repertoire of teaching skills includes a variety of means to assist student acquisition of new knowledge and skills using that knowledge.

5. **DIVERSITY**
   5.1 The preprofessional teacher establishes a comfortable environment which accepts and fosters diversity. The teacher must demonstrate knowledge and awareness of varied cultures and linguistic backgrounds. The teacher creates a climate of openness, inquiry, and support by practicing strategies such as acceptance, tolerance, resolution, and mediation.

8.PRE.b Increases subject matter knowledge in order to integrate the learning activities.

8.PRE.c Uses the materials and technologies of the subject field in developing learning activities for students.

8.PRE.f Develops short- and long-term personal and professional goals relating to knowledge of subject matter.

11. **ROLE OF THE TEACHER**
   11.1 The preprofessional teacher communicates and works cooperatively with families and colleagues to improve the educational experiences at the school.

12. **TECHNOLOGY**
   12.1 The preprofessional teacher uses technology as available at the school site and as appropriate to the learner. She/he provides students with opportunities to actively use technology and facilitates access to the use of electronic resources. The teacher also uses technology to manage, evaluate, and improve instruction.

12.PRE.b Uses technology tools on a personal basis.

12.PRE.c Demonstrates awareness of and models acceptable use policies and copyright issues.

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12.PRE.i Selects and utilizes educational software tools for instructional purposes based upon reviews and recommendations of other professionals.

12.PRE.j Uses digital information obtained through intranets and/or the Internet (e.g., e-mail and research).

12.PRE.k Uses technology to collaborate with others.

12.PRE.l Develops professional goals relating to technology integration.

Florida Teacher Certification Examination (FTCE) Subject Area Examination (SAE) Competencies and Skills

1 Knowledge of the investigative processes of science
1.1 Identify components, proper use, and care of light microscopes.
1.4 Identify proper techniques for field studies (e.g., site selection, sampling, transects, collecting techniques, environmental measurements).
1.10 Identify relationships between the variables and possible outcomes of a specific experiment.

3 Knowledge of the chemical process of living things
3.4 Identify substrates, products, and relationships in aerobic respiration (e.g., glycolysis, the Krebs cycle, electron transport), including metabolism of carbohydrates, fats, and amino acids, and in anaerobic respiration (e.g., alcoholic fermentation, lactic acid fermentation).
3.6 Identify the raw materials and products of C3 photosynthesis, as well as factors that affect the rate of light-dependent reactions and the Calvin cycle.
3.7 Identify key differences between C3, C4, and CAM photosynthesis, and the evolutionary and ecological significance of these pathways.
3.8 Analyze the role of chemiosmosis in photosynthesis and respiration.
3.12 Evaluate the roles of cell recognition (e.g., cell-to-cell signaling, autoimmune diseases, tissue rejection, cancer, pollen or stigma-style interaction) in normal and abnormal cell activity.
3.15 Compare chemosynthetic and photosynthetic processes and the roles of organisms using these processes in the ecosystem.

4 Knowledge of the interaction of cell structure and function
4.5 Compare the mechanisms and results of nuclear division (i.e., karyokinesis) and cell division (i.e., cytokinesis) in plant and animal cells.
4.8 Compare active and passive cellular transport mechanisms.

5 Knowledge of genetic principles, processes, and applications
5.8 Analyze the processes and products of meiosis in plants, animals, and fungi.

7 Knowledge of the structural and functional diversity of protists, fungi, and plants
7.1 Identify major types of protists, fungi, and plants.
7.2 Identify the positive and negative effects of protists, fungi, and plants on other living things.
7.3 Relate the structures of specialized plant tissues to their functions.
7.4 Relate the characteristics of vascular and nonvascular plants to adaptations allowing these organisms to broaden their ecological niches.
7.5 Identify the functions of the major organs of angiosperms and gymnosperms and the survival advantages associated with those organs.
7.6 Compare the structures of monocots and dicots (e.g., seeds, vascular bundles, venation, flower parts).
7.7 Relate the major mechanisms (e.g., transport, storage, water conservation, reproduction, transpiration) in plants to environmental stimuli.
7.8 Analyze the role of major plant growth regulators (e.g., auxins, gibberellins, ethylene).
7.9 Identify methods of reproduction in plants.
7.10 Analyze patterns of alternation of generations in plants, fungi, and algae.

National Science Teachers Association Standards
C.2.a. Core Competencies. All teachers of biology should be prepared to lead students to understand the unifying concepts required of all teachers of science, and should in addition be prepared to lead students to understand:
1. Life processes in living systems including organization of matter and energy
5. Ecological systems including the interrelationships and dependencies of organisms with each other and their environments.
8. Organization and functions of cells and multicellular systems.
11. Fundamental processes of modeling and investigating in the biological sciences.

C.2.b. Advanced Competencies. In addition to these core competencies, teachers of biology as a primary field should be prepared to effectively lead students to understand:
18. Issues related to living systems such as genetic modification, uses of biotechnology, cloning, and pollution from farming.
19. Historical development and perspectives in biology including contributions of significant figures and underrepresented groups, and the evolution of theories in biology.
20. How to design, conduct, and report research in biology.

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C.2.c. Supporting Competencies. All teachers of biology should also be prepared to effectively apply concepts from other sciences and mathematics to the teaching of biology including basic concepts of:
22. Chemistry, including general chemistry and biochemistry with basic laboratory techniques.

**Teaching Methods**
Lectures, class discussions, brainstorming sessions, problem centered hands on investigations, research and technologies such as internet, CD-ROM, blackboard and computer animations

**Topical Outline**
1. Plant Org, Growth & Development (NCATE 5:2; SSS Strand F-2; G-1; H-1)
2. Plant Growth (NCATE 5:5-6; 7:2; Eukaryotic organisms:15; 18; SSS Strand F-2)
3. Primary Structure (NCATE 7:1-2; Eukaryotic organisms:15; SSS Strand F-2)
4. Xylem, Phloem and Secretory Struc. (NCATE 6:4; Eukaryotic organisms:15; 16; 1920, SSS Strand F-2)
5. Epidermis (NCATE Eukaryotic organisms:15-19; SSS Strand F-2)
6. Stems (NCATE Eukaryotic organisms:15-19; SSS Strand F-2)
7. Leaves (NCATE Eukaryotic organisms:15-19; SSS Strand F-2)
8. Roots (NCATE Eukaryotic organisms:15-19; SSS Strand F-2)
9. Secondary Plant Body (NCATE Eukaryotic organisms:15-19; SSS Strand F-2)
10. Evolution and Systematics (NCATE Eukaryotic organisms:15-22; 24; SSS Strand F-2; H-1)
11. Macromorphology (NCATE Eukaryotic organisms:15-19; 5:5SSS Strand F-2)
12. Structure and Function (NCATE Eukaryotic organisms:15-19; SSS Strand F-2; H-1)
13. Ecological Anatomy (NCATE 8:3; SSS Strand F-2; G-2)
14. Plant Breeding, Defense Mechanisms (NCATE 9:3; SSS Strand F-2)

**Course Evaluation**
Class Participation in class activities and hands-on activities, Laboratory Projects and Assignments, Exams/Final Exams, Final Scientific Paper

**Course Policies**

**Policy Statement on Non-Discrimination** It is the policy of Florida Agricultural and Mechanical University to assure that each member of the University community be permitted to work or attend classes in an environment free from any form of discrimination including race, religion, color, age, disability, sex, marital status, national origin, veteran status and sexual harassment as prohibited by state and federal statutes. This shall include applicants for admission to the University and employment.

**Academic Honor Policy** The University’s Academic Honor Policy is located in the FANG Student Handbook, under the Student Code of Conduct-Regulation 2.012 section, beginning on page 55-56.

**ADA Compliance** To comply with the provisions of the Americans with Disabilities Act (ADA), please advise instructor of accommodations required to insure participation in this course. Documentation of disability is required and should be submitted to the Learning Development and Evaluation Center (LDEC). For additional information please contact the LDEC at (850) 599-3180.

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Gradings

<table>
<thead>
<tr>
<th>Lect. Exam 1</th>
<th>100</th>
<th>A (90% and above)</th>
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<tbody>
<tr>
<td>Lect. Exam 2</td>
<td>100</td>
<td>B (80-89%)</td>
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<tr>
<td>Lect. Exam 3</td>
<td>100</td>
<td>C (70-79%)</td>
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<tr>
<td>Comp. Final-4</td>
<td>110</td>
<td>D (60-69%)</td>
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<td>Final Scientific Paper</td>
<td>50</td>
<td>F (59% and below)</td>
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<td>Attendance+ Class Participation</td>
<td>25</td>
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<td><strong>Total possible Points</strong></td>
<td>485 (=100%)</td>
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Tentative Course Calendar

<table>
<thead>
<tr>
<th>WEEK OF………………</th>
<th>LECTURE TOPICS……………………………….</th>
<th>READING ASSIGNMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 29</td>
<td>Syllabus, Concepts, Intro to Plant Anatomy, Cell</td>
<td>Ch. 1, Ch. 3</td>
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<tr>
<td>Sept 5 (no class), Sept 7</td>
<td>Cells and Tissues of Plant Body</td>
<td>Ch. 23</td>
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<tr>
<td>Sept 12</td>
<td>Meristems and Their Derivatives</td>
<td>Ch. 23</td>
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<tr>
<td>Sept 19, Monday….</td>
<td>Exam 1………………………………………...</td>
<td>Study your notes +textbook</td>
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<tr>
<td>Sept 21-26</td>
<td>Xylem and Phloem</td>
<td>-</td>
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<tr>
<td>Oct 3</td>
<td>Root</td>
<td>Ch. 24</td>
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<tr>
<td>Oct 10</td>
<td>Stem</td>
<td>Ch. 25</td>
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<tr>
<td>Oct 17</td>
<td>Leaf</td>
<td>Ch. 25</td>
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<tr>
<td>Oct 10, Monday…..</td>
<td>Exam 2………………………………………...</td>
<td>Study your notes +textbook</td>
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<tr>
<td>Oct 12-17</td>
<td>Secondary Plant Body</td>
<td>Ch. 26</td>
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<td>Oct 24</td>
<td>Flowers, Fruits and Seeds</td>
<td>Ch. 19</td>
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<tr>
<td>Oct 31</td>
<td>Systematics and Evolution</td>
<td>Ch. 12</td>
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<tr>
<td>Nov 14, Monday…..</td>
<td>Exam 3………………………………………...</td>
<td>Study your notes +textbook</td>
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<tr>
<td>Nov 16</td>
<td>Plant Hormones</td>
<td>Ch. 27</td>
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<td>Nov 21</td>
<td>Plant Nutrition</td>
<td>Ch. 28</td>
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<tr>
<td>Dec 5</td>
<td>Plant Genetics</td>
<td>Ch. 8</td>
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<tr>
<td>Dec 7</td>
<td>Final Paper due, Course Summary, Assessment</td>
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<td>Dec 16, Friday 3pm…..</td>
<td>Required Comp Final Exam……………………..</td>
<td>Study your notes +textbook</td>
</tr>
</tbody>
</table>

References

1. Biology of Plants (7th ed) by Raven, Evert, Eichhorn (2005), Publ: WH Freeman
2. Plant Physiology Online: http://4e.plantphys.net/index2.php

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