Graduate Council Report
7 December 2006

Course Change Request

Course Title:

C629 RLEM 607 Range Plant Ecophysiology

FROM: Range Plant Ecophysiology
RANGE PLANT ECOPHYSLGY

TO: Physiological Plant Ecology
PHYSIOLOGICAL PLANT ECO

Course Title and Description:

C631 WFSC 630 Ecology for Teachers

FROM: Ecology for Teachers
ECOLOGY FOR TEACHERS

TO: Ecology & Society
ECOLOGY AND SOCIETY

FROM: Lectures, discussions and readings in principles of ecology and their application in today’s problems in environmental conservation.

TO: Students study and compare human and natural ecosystems using diversity, interrelations, cycles, and energy as the conceptional organization; central themes of the course are sustainability, stewardship & science.

Course Description:

C630 HORT 601 Nutrition of Horticultural Plants

FROM: Principles of nutrition related to management practices of fruit, nut, ornamental and vegetable plants; practice in leaf nutrient analysis by atomic absorption and plasma emission spectrophotometry and autoanalyzer; development of skills in hydroponic nutrition research.

TO: Principles of nutrition related to horticultural plants; micro- and macronutrients; root uptake; short- and long-distance transport; management practices of fruit, nut, ornamental and vegetable plants; development of skills in nutrition research.

Course Description, Prerequisite, Hours

C632 CVEN 628 Advanced Hydraulic Engineering

Description
FROM: Newton Raphson pipe network analysis, unsteady flow in pipelines and pipe networks; method of characteristics; river engineering; two-dimensional streamflow modeling; design of hydraulic structures.
Texas A&M University

Artmental Request for a Change in Course
Undergraduate • Graduate • Professional

Submit original form and 2 copies

1. This request is submitted by the Department of **Rangeland Ecology and Management**

2. Course prefix, number and complete title of course: **RLEM 607: Range Plant Ecophysiology**

3. Change requested:
   a) Prerequisite(s): From ______________________________ To ______________________________
   b) Withdrawal (reason) ______________________________
   c) Cross-list with ______________________________

4. Cross-listed courses require the signatures of both department heads.

5. Change in course title and description. Enter complete current course title and current course description; complete proposed course title and proposed course description in items 4 and 5.

6. Change in credit/contact hours. Complete item 6b. Underscore change(s). Attach a course syllabus.

4. Complete current course title and current course description: **RLEM 607: Range Plant Ecophysiology**;
   - Investigation of physiological mechanisms influencing ecological patterns and processes, including plant acclimation and adaption in contrasting habitats, abiotic controls on species productivity and distribution, relevant conceptual and experimental approaches, and integration among ecological scales.

5. Complete proposed course title and proposed course description (not to exceed 50 words): **RLEM 607**;
   - Physiological Plant Ecology, investigation of physiological mechanisms influencing ecological patterns and processes, including plant acclimation and adaption in contrasting habitats, abiotic controls on species productivity and distribution, relevant conceptual and experimental approaches, and integration among ecological scales.

6. a) As currently in course inventory:
<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLEM</td>
<td>607</td>
<td>RANGE PLANT ECOPHYSIOLOGY</td>
</tr>
<tr>
<td>Lect.</td>
<td>Lab</td>
<td>SCH Subject Matter Content Code</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>0 0 0 1 1 0 6 0 0 0 5 2 4 6 5 0 3 6 3 2</td>
</tr>
</tbody>
</table>
   
   b) Changed to:
<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLEM</td>
<td>607</td>
<td>PHYSIOLOGICAL PLANT ECO</td>
</tr>
<tr>
<td>Lect.</td>
<td>Lab</td>
<td>SCH Subject Matter Content Code</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>0 0 0 1 1 0 6 0 0 0 5 2 4 6 5 0 0 3 6 3 2</td>
</tr>
</tbody>
</table>

Approval recommended by:

- **D. W. Issac**
  - Head of Department
  - Date: 7/23/06

- **David L. Reed**
  - Chair, College Review Committee
  - Date: 10/11/06

Head of Department (if cross-listed course)
- **D. W. Issac**
  - Date: 10-11-06

Submitted to Coordinating Board by:

- **M. O. D. G.**
  - Date: 10-11-06

Director of Academic Support Services
- Date: 

To have this form reviewed, please send to Linda F. Lacey, Mail Stop 1265 or fax to 847-8737. 2 of 19 L
Physiological Plant Ecology  
**RLEM 607**  
**Fall 2006**

**COURSE INTRODUCTION**

**OBJECTIVES:**
Investigation of physiological mechanisms influencing ecological patterns and processes, including plant acclimation and adaptation in contrasting habitats, abiotic controls on species productivity and distribution, relevant conceptual and experimental approaches, and integration across ecological scales. Each subject matter section begins with an introduction of the relevant physiological processes and develops toward an ecological synthesis of these processes at community or ecosystem scales.

**INSTRUCTOR:**
Dr. David D. Briske  
Department of Rangeland Ecology and Management  
Animal Industries Building, Room 328  
Telephone: 845-5581  
email: dbriske@tamu.edu

**MEETING TIME AND LOCATION:**
Monday, Wednesday and Friday, 9:10 - 10:00 am.  
Animal Industries Building, Room 133.

**READING ASSIGNMENTS:**
Text: Plant Physiological Ecology, Lambers H., Chapin F.S. and Pons T.L. 1998 Springer-Verlag. Reading assignments within this text are referenced by section on the attached syllabus. Journal papers will also be assigned for each subject matter section. These papers are available on the course home page (WebCT-Vista).

**PREREQUISITES:**
RENR 205 or MEPS 313 or equivalent

**EVALUATION PROCEDURES:**
Exams will consist of definitions and short-answer questions. Problem sets will require synthesis and application of information addressed in lectures, the text and assigned readings to an actual or hypothetical ecological scenario. Problems sets will be made available on the course home page.

<table>
<thead>
<tr>
<th>Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam I</td>
<td>100</td>
</tr>
<tr>
<td>Exam II</td>
<td>100</td>
</tr>
<tr>
<td>Final Exam (Comprehensive)</td>
<td>100</td>
</tr>
<tr>
<td>Take-home Problems</td>
<td><strong>200 points</strong></td>
</tr>
<tr>
<td></td>
<td>500 points</td>
</tr>
</tbody>
</table>
RANGE PLANT ECOPHYSIOLOGY
COURSE SYLLABUS
RLEM 607

I. Introduction to Physiological Plant Ecology

A. Discipline Definition and Approach

B. Discipline Development (Chapter 1)

II. Plant Processes and Environmental Interactions

A. Radiation Budgets (Chapter 4, p. 210-228)
   1. Radiation laws and terminology
   2. Leaf spectral characteristics
      a. reflection
      b. absorption
      c. transmission
   3. Leaf orientation
      a. cosine law
      b. solar tracking
   4. Energy dissipation
      a. reradiation
      b. convection
      c. latent heat transfer
      d. environmental constraints
   5. Ecological implications
      a. optimal leaf size
      b. specific energy budgets

B. Whole-Plant Photosynthesis (Chapter 2A, p. 10-89)
   1. Photosynthetically active radiation
   2. Radiation attenuation
      a. canopy architecture
      b. radiation quality
   3. Adaptation to radiation environments
      a. heliophytes and scrophylates
      b. physiological acclimation
      c. canopy-level modifications
   4. Photosynthetic pathways
      a. Calvin-Benson (C₃)
      b. Hatch-Slack (C₄)
      c. C₄ subgroups
      d. C₃-C₄ intermediates
      e. Crassulacean Acid Metabolism (CAM)
      f. pathway evolution
   5. Regulation of photosynthesis
      a. CO₂ response curve
      b. feedback mechanisms
      c. resource constraints
   6. Comparison of photosynthetic pathways
      a. CO₂ compensation point
b. light saturation point
c. light compensation point
d. photorespiration
e. temperature optima
f. water-use efficiency
g. nitrogen-use efficiency
h. $^{13}$C/$^{12}$C ratio
i. photosynthetic capacity
j. quantum yield
k. productivity

7. Pathway distribution
   a. patterns
   b. controls

8. Response to elevated CO$_2$
   a. pathway comparison
   b. CO$_2$ acclimation
   c. ecosystem responses

9. Ecological implications

C. Relative Growth Rate
   1. Plant growth
   2. Basis for variation
   3. Physiological mechanisms
   4. Resource constraints
   5. Ecological implications

(D. Competitive Interactions
   1. Concepts and mechanisms
   2. Grime and Tilman models
   3. Plant functional traits
   4. Experimental designs and indices
   5. Ecological implications

E. Plant Water Relations
   1. Concepts and measurements
      a. relative water content
      b. water potential
      c. instrumentation
   2. Soil-plant-atmosphere continuum
      a. transpiration
      b. transport mechanisms
      c. hydraulic conductivity
      d. cavitation and xylem refilling
      e. conductivity–cavitation trade-off
   3. Water absorption
      a. hydraulics of water uptake
      b. root traits and distribution
      c. hydrogen isotope ratios
      d. hydraulic lift
   4. Plant water stress
      a. developmental patterns
      b. physiological consequences

(Chapter 7, p. 299-345)

(Chapter 9E, p. 458-483)

(Chapter 3, p. 154-204)
c. mechanisms of injury
5. Drought resistance
   a. tolerance mechanisms
   b. avoidance mechanisms
   c. plant strategies
6. Ecological implications
   a. species replacement
   b. precipitation gradients

F. Plant-Soil Relations
   1. Nutrients in the soil
      a. availability
      b. distribution
   2. Nutrient acquisition
      a. absorption
      b. root traits
      c. life span
      d. environmental constraints
      e. mycorrhiza
   3. Nutrient-use efficiency
      a. retention
      b. resorption
   4. Adaptive strategies
      a. root proliferation
      b. physiological plasticity
      c. inorganic N uptake
      d. life history strategies

G. Ecosystems and Global Processes
   1. Scaling from leaf to globe
   2. Climate controls on leaf attributes
   3. Global change processes

(Chapter 6, p. 239-263; 282-292)
(Chapter 10B, p. 503-515)
(Final Exam; 12/11; 8:00am)
Texas A&M University

Formal Request for a Change in Course

Undergraduate • Graduate • Professional

Submit original form and 2 copies

1. This request is submitted by the Department of Wildlife & Fisheries Sciences

2. Course prefix, number and complete title of course: WFSC 630 - Ecology for Teachers

3. Change requested:
   a) Prerequisite(s): From ___________________________ To ___________________________
   b) Withdrawal (reason) ___________________________
   c) Cross-list with ___________________________
      Cross-listed courses require the signatures of both department heads.
   d) Change in course title and description. Enter complete current course title and current course description; complete proposed course title and proposed course description in items 4 and 5.
   e) Change in credit/contact hours. Complete item 6b. Underscore change(s). Attach a course syllabus.

4. Complete current course title and current course description: WFSC 630 - Ecology for Teachers
   Lectures, discussions and readings in principles of ecology and their application in today's problems in environmental conservation

5. Complete proposed course title and proposed course description (not to exceed 50 words): WFSC 630 - Ecology & Society: Students study and compare human and natural ecosystems using diversity, interrelations, cycles, and energy as the conceptional organization; central themes of the course are sustainability, stewardship & science.

6. a) As currently in course inventory:
<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFSC 630</td>
<td>ECOLOGY FOR TEACHERS</td>
<td></td>
</tr>
<tr>
<td>Lect.</td>
<td>Lab</td>
<td>SCH</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
   b) Changed to:
<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFSC 630</td>
<td>ECOLOGY AND SOCIETY</td>
<td></td>
</tr>
<tr>
<td>Lect.</td>
<td>Lab</td>
<td>SCH</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Approval recommended by:

[Signatures and dates]

Head of Department Date
Chair, College Review Committee Date
Dean of College Date

Submitted to Coordinating Board by:

[Signature and date]

Dean of College Date

Director of Academic Support Services Date Effective Date

To have this form reviewed, please send to Linda F. Lacey, Mail Stop 1265 or fax to 847-8737.
OAR/AS-504
Course Syllabus
WFSC 420/630 Ecology & Society

Instructor:

Clark E. Adams, 113 Nagle Hall, 979-845-8824, clark.adams@tamu.edu (by appointment)

Course Prerequisites:
G6 or higher student classification

Course Description:

This course was designed to: (1) establish a learning environment that awakens students' curiosity about the world they live in, (2) stimulate students' desire to expand their knowledge about how the world works, (3) give students the opportunity to measure their growth in knowledge (content) and understanding (application of content) and (4) challenge students to translate their new knowledge and understanding into personal actions and self-realizations. Pre- and in service classroom teachers are given the opportunity to: (1) use the symbolic tools of thinking, communicating and inquiring about ecology; (2) synthesize and interpret basic facts about the human and natural ecosystems using a diversity, interrelationships, cycles and energy (DICE) conceptual organization; (3) organize information about ecosystems based on the conceptual organization, principles of ecology, past cultural development, the existing social order and economics and (4) evaluate consistency and reasonableness in their decisions and judgments about hypothetical or simulated conflict situations between humans and natural ecosystems. Both traditional and online sections are provided.

Course Materials:

3. Power point lecture notes for each chapter in the above book.
4. Streaming videos of all lectures - online url site or cd-rom discs.

Course Text Outline

1 Introduction: Toward a Sustainable Future

Ecosystems: Basic Units of the Natural World
2 Ecosystems: What They Are
3 Ecosystems: How They Work
4 Ecosystems: How They Change

The Human Population
5 The Human Population: Dimensions
6 Population and Development

Renewable Resources
7 Water: Hydrologic Cycle and Human Use
8 Soil: Foundation for Land Ecosystems
9 The Production and Distribution of Food
10 Wild Species and Biodiversity
11 Ecosystem Capital: Use and Restoration
**Energy**
12 Energy from Fossil Fuels
13 Energy from Nuclear Power
14 Renewable Energy

**Pollution and Prevention**
15 Environmental Hazards and Human Health
16 Pests and Pest Control
17 Water Pollution and Its Prevention
18 Municipal Solid Waste: Disposal and Recovery
19 Hazardous Chemicals: Pollution and Prevention
20 The Atmosphere: Climate, Climate Change, and Ozone Depletion
21 Atmospheric Pollution

**Toward a Sustainable Future**
22 Economics, Public Policy, and the Environment
23 Sustainable Communities and Lifestyles

Typical Lecture Topic Sequence (example from Spring term 2006)

<table>
<thead>
<tr>
<th>Date</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 17</td>
<td>Chapter 1: Introduction: Toward a Sustainable Future</td>
</tr>
<tr>
<td>January 19</td>
<td>Chapter 2: Ecosystems: What They Are</td>
</tr>
<tr>
<td>January 24</td>
<td>Chapter 3: Ecosystems: How They Work</td>
</tr>
<tr>
<td>January 26</td>
<td>Chapter 4: Ecosystems: How They Change</td>
</tr>
<tr>
<td>January 31</td>
<td>Exam 1: Chapters 1 through 4</td>
</tr>
<tr>
<td>February 2</td>
<td>Chapter 5: The Human Population: Dimensions</td>
</tr>
<tr>
<td>February 7</td>
<td>Chapter 6: Population and Development</td>
</tr>
<tr>
<td>February 9</td>
<td>Chapter 9: The Production and Distribution of Food</td>
</tr>
<tr>
<td>February 14</td>
<td>Exam 2: Chapters 5, 6, and 9</td>
</tr>
<tr>
<td>February 16</td>
<td>Chapter 8: Soil: Foundation for Land Ecosystems</td>
</tr>
<tr>
<td>February 21</td>
<td>Chapter 7: Water: Hydrological Cycle and Human Use</td>
</tr>
<tr>
<td>February 23</td>
<td>Chapter 17: Water Pollution and Its Prevention</td>
</tr>
<tr>
<td>February 28</td>
<td>Exam 3: Chapters 8, 7 and 17</td>
</tr>
<tr>
<td>March 2</td>
<td>Chapter 10: Wild Species: Biodiversity and Protection</td>
</tr>
<tr>
<td>March 7</td>
<td>Chapter 11: Ecosystem Capital: Use and Restoration</td>
</tr>
<tr>
<td>March 9</td>
<td>Chapter 16: Pests and Pest Control</td>
</tr>
<tr>
<td>March 21</td>
<td>Exam 4: Chapters 10, 11 and 16</td>
</tr>
<tr>
<td>March 23</td>
<td>Chapter 18: Municipal Solid Waste: Disposal and Recovery</td>
</tr>
<tr>
<td>March 28</td>
<td>Chapter 20: The Atmosphere: Climate, Climate Change and Ozone Depletion</td>
</tr>
<tr>
<td>March 30</td>
<td>Chapter 21: Atmospheric Pollution</td>
</tr>
<tr>
<td>April 4</td>
<td>Exam 5: Chapters 18, 20 and 21</td>
</tr>
<tr>
<td>April 6</td>
<td>Chapter 12: Energy From Fossil Fuels</td>
</tr>
<tr>
<td>April 11</td>
<td>Chapter 13: Energy from Nuclear Power</td>
</tr>
<tr>
<td>April 13</td>
<td>Chapter 14: Renewable Energy</td>
</tr>
<tr>
<td>April 18</td>
<td>Chapter 23: Sustainable Communities and Life Styles</td>
</tr>
<tr>
<td>April 20</td>
<td>Exam 6: Chapters 12, 13, 14 and 23</td>
</tr>
</tbody>
</table>
Course Grade:

The average of six online exams that total 781 points. Exams consist of a blend of Matching, and Short Answer types of questions patterned after those used in the course study guide.

1. Grading Distribution for Undergraduate will be based their average score on six exams:

   \[
   \begin{align*}
   \geq 90 \% \text{ of } 781 &= A \\
   80\% \text{ to } 89\% \text{ of } 781 &= B \\
   70\% \text{ to } 79\% \text{ of } 781 &= C \\
   60\% \text{ to } 69\% \text{ of } 781 &= D \\
   < 60\% \text{ of } 781 &= F 
   \end{align*}
   \]

2. Additional Course Work for Graduate Students

   A term paper covering one of the subtopics under the major course concepts listed above. This paper should have a particular emphasis on the human impacts (positive and/or negative) on the subtopic. For example, the term paper could address the ecological, social, economic, and cultural ramifications associated with the development of renewable energy alternatives. The term paper will be worth 100 points of the course grade.

3. Grading Distribution for Graduate Students

   A. Two-thirds of the course grade will be determined by total points earned over the six exams mentioned above.

   B. One-third of the course grade will be determined by total points earned on the term paper.

Example: If a student has 90% on course tests and 75% on the term paper, the course grade will be \(0.90 \times \frac{2}{3} + 0.75 \times \frac{1}{3} = 0.60 + 0.25 = 0.85\) or A for the course.

The Americans with Disabilities Act (ADA)

The Americans with Disabilities Act is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Service for Students with Disabilities in Room 126 of the Koldus Building or call 845-1637

The Aggie Code of Honor

"An Aggie does not lie, cheat or steal or tolerate those that do."
Integrity is a core value of a society that offers hope, the promise of security, and meaning to individuals within that society. Within the university, academic integrity is the most critical core value of the learning community. Integrity makes trust among people possible. Without trust - and honesty that breeds trust - our society and our universities cannot flourish.
http://www.tamu.edu/aggiehonor

Texas A&M University student rules Section 20 outlines official policies on scholastic dishonesty (http://student-rules.tamu.edu/rule20.htm). Section 20 declares, “It is the responsibility of students and instructors to help maintain scholastic integrity at the University by refusing to participate in or tolerate scholastic dishonesty.” Further, Section 20 defines various categories of scholastic dishonesty.
As a professional responsibility, and as an instructor in WFSC 201, I am obligated to follow the provisions of Section 20, Texas A&M University Student Rules on Academic Dishonesty.

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

Signature of Student
Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
• Submit original form and 2 copies •

1. This request is submitted by the Department of Horticultural Sciences

2. Course prefix, number and complete title of course: HORT 601 Nutrition of Horticultural Plants

3. Change requested:
   a) Prerequisite(s): From ___________________________ To ___________________________
   b) Withdrawal (reason) ____________________________
   c) Cross-list with ____________________________

   Cross-listed courses require the signatures of both department heads.
   d) Change in course title and description: Enter complete current course title and current course description; complete proposed course title and proposed course description in items 4 and 5.

   e) Change in credit/contact hours. Complete item 6b. Underscore change(s). Attach a course syllabus.

4. Complete current course title and current course description: Nutrition of Horticultural Plants: Principles of nutrition related to management practices of fruit, nut, ornamental and vegetable plants; practice in leaf nutrient analysis by atomic absorption and plasma emission spectrophotometry and autoanalyzer; development of skills in hydroponic nutrition research.

5. Complete proposed course title and proposed course description (not to exceed 50 words): Nutrition of Horticultural Plants: Principles of nutrition related to horticultural plants; micro- and macronutrients; root uptake; short- and long-distance transport; management practices of fruit, nut, ornamental and vegetable plants; development of skills in nutrition research.

6. a) As currently in course inventory:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORT</td>
<td>601</td>
<td>NUTRITION OF HORT PLANTS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lect.</th>
<th>Lab</th>
<th>SCH</th>
<th>Subject Matter Content Code</th>
<th>Admin. Unit</th>
<th>FICE Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>30</td>
<td>04</td>
<td>1030400051520</td>
<td>03632</td>
<td></td>
</tr>
</tbody>
</table>

   Do not complete shaded area.

   b) Changed to:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Lect.</th>
<th>Lab</th>
<th>SCH</th>
<th>Subject Matter Content Code</th>
<th>Admin. Unit</th>
<th>Acad. Year</th>
<th>FICE Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>003632</td>
<td></td>
</tr>
</tbody>
</table>

Approval recommended by: ________________________________

Head of Department Date ________________________________

Chair, College Review Committee Date ____________________

Dean of College Date 10-11-06

Submitted to Coordinating Board by: ________________________________

Dean of College Date ________________________________

Director of Academic Support Services Date ________________________________

Effective Date ________________________________

To have this form reviewed, please send to Linda F. Lacey, Mail Stop 1265 or fax to 847-8737. 12 of 19 L

OAR/AS-504
# Horticulture 601

*Nutrition of Horticultural Plants*

## Fall Semester 2007

### Syllabus

| **Instructor** | Leonardo Lombardini  
Department of Horticultural Sciences, 426 HFSB  
Office phone: 458-8079, E-mail: l-lombardini@tamu.edu |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Office hours</strong></td>
<td>Anytime, by appointment</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>MHPS 313 or equivalent</td>
</tr>
<tr>
<td><strong>Lectures</strong></td>
<td>Tuesday and Thursday, 9:35-10:50, 115 HFSB</td>
</tr>
<tr>
<td><strong>Lab</strong></td>
<td>Tuesday, 2:00 to 5:00 P.M., 115 HFSB</td>
</tr>
<tr>
<td><strong>Course objectives</strong></td>
<td>This course will examine principles of nutrition related to horticultural plants; micro- and macronutrients; root uptake; short- and long- distance transport; management practices of fruit, nut, ornamental and vegetable plants; development of skills in nutrition research.</td>
</tr>
</tbody>
</table>

## Lecture schedule

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Course Introduction</em></td>
</tr>
</tbody>
</table>
| 2 | **Plant nutrients**  
- Definition of essentiality of elemental nutrients  
- Classification of elemental nutrients  
- Physiological functions of elemental nutrients |
| 3 | **Short distance transport**  
- Structure and function of biological membranes  
- Diffusion  
- Fluxes across membranes  
- Passage into the cytoplasm and the vacuole  
- Ion channels |
| 4 | **Short distance transport II**  
- Active transport: electronic pumps  
- ATPases  
- Nerst equation  
- Symport and antiport  
- Apoplasms and symplasm  
- Structure and function of plasmodesmata  
- Kinetics of transport |
| 5 | **Short distance transport III**  
|   | - Feedback regulation and luxury uptake  
|   | **Ion uptake by roots**  
|   | - Pathway of solutes from external solution into roots  
|   |   - Root anatomy as related to development  
|   |   - Influx into the apparent free space  
|   |   - Sites of ion uptake by roots  
|   |   - Pathways for radial transport across the root  
|   |   - Regulatory mechanisms of ion uptake and transport in roots  
|   |   - Interaction between ions: competition, the role of pH, ion  
|   |   - Synergism and the role of Ca$^{2+}$  
| 6 | **Transport of solutes via the xylem**  
|   | - Xylem anatomy and ontogeny  
|   | - Equations describing xylem transport  
|   | - Regulation of ion transport via the xylem  
|   | - Positive root pressure and guttation  
| 7 | **Phloem translocation of elemental nutrients**  
|   | - Phloem anatomy  
|   | - Phloem loading and unloading  
| 8 | **Phloem translocation of elemental nutrients**  
|   | - Biophysics of phloem transport  
|   | - Ionic concentrations in phloem solution  
|   | **Remobilization of elemental nutrients**  
|   | **Uptake and release of mineral elements by leaves and other aerial plant parts**  
|   | - Uptake by leaf cells  
|   | - Leaching of mineral elements from leaves  
| 9 | **Yield and the source-sink relationship**  
|   | - Photosynthesis and related processes  
|   | - Leaf senescence  
|   | **Mineral nutrition and yield response**  
|   | - Leaf Area Index and net photosynthesis  
|   | - Mineral nutrition supply, sink formation, and sink activity  
|   | - Tubervization  
|   | **Shoot-root communication and rapid signaling system**  
|   | - Electrical and hydraulic signaling  
|   | - Action potentials  
| 10 | **Nitrogen**  
| 11 | **Nitrogen**  
| 12 | **Nitrogen fixation**  
| 13 | **Sulfur**  
|   | **Phosphorus**  
| 14 | **Magnesium**  

14 of 19 L
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Calcium</td>
</tr>
<tr>
<td>16</td>
<td>Potassium</td>
</tr>
<tr>
<td>17</td>
<td>Iron</td>
</tr>
<tr>
<td>18</td>
<td>Manganese</td>
</tr>
<tr>
<td></td>
<td>Copper</td>
</tr>
<tr>
<td>19</td>
<td>Zinc</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
</tr>
<tr>
<td>20</td>
<td>Molybdenum</td>
</tr>
<tr>
<td></td>
<td>Boron</td>
</tr>
<tr>
<td>21</td>
<td>Chlorine</td>
</tr>
<tr>
<td></td>
<td><strong>Beneficial mineral elements</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Diagnosis of deficiency and toxicity of mineral nutrients</strong></td>
</tr>
<tr>
<td></td>
<td>- Nutrient supply and growth response</td>
</tr>
<tr>
<td></td>
<td>- Diagnosis of nutritional disorders by visible symptoms</td>
</tr>
<tr>
<td></td>
<td>- Plant analysis</td>
</tr>
<tr>
<td></td>
<td>- Histochemical and biochemical methods</td>
</tr>
<tr>
<td></td>
<td>- Plant analysis versus soils analysis</td>
</tr>
<tr>
<td>22</td>
<td><strong>Nutrient availability in soils</strong></td>
</tr>
<tr>
<td></td>
<td>- Chemical soil analysis</td>
</tr>
<tr>
<td></td>
<td>- Movement of nutrients to the root surface</td>
</tr>
<tr>
<td></td>
<td>- Role of root density</td>
</tr>
<tr>
<td></td>
<td>- Nutrient availability and distribution of water in soils</td>
</tr>
<tr>
<td></td>
<td>- Role of soil structure</td>
</tr>
<tr>
<td></td>
<td>- Intensity/quantity ratio, plant factors, and consequences for soil testing</td>
</tr>
<tr>
<td>23</td>
<td><strong>Effect of internal and external factors on root growth and development</strong></td>
</tr>
<tr>
<td></td>
<td>- Carbohydrate supply</td>
</tr>
<tr>
<td></td>
<td>- Root morphology, hormonal interactions</td>
</tr>
<tr>
<td></td>
<td>- Soil chemical factors</td>
</tr>
<tr>
<td></td>
<td>- Rhizosphere microorganisms</td>
</tr>
<tr>
<td></td>
<td>- Soil physical factors</td>
</tr>
<tr>
<td></td>
<td>- Shoot/root ratio</td>
</tr>
<tr>
<td>23</td>
<td><strong>Foliar application of mineral nutrients</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Controlled-release fertilizers</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Fertigation</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Adaptation of plants to adverse chemical soil conditions</strong></td>
</tr>
<tr>
<td></td>
<td>- Waterlogged and flooded soils</td>
</tr>
<tr>
<td></td>
<td>- Salinity</td>
</tr>
<tr>
<td>24</td>
<td>How to apply what you have learned to the real world Part I – Dealing with container-grown plants</td>
</tr>
<tr>
<td>25</td>
<td>How to apply what you have learned to the real world Part II – Dealing with local soils</td>
</tr>
</tbody>
</table>

**Assigned readings and class notes**
- Assigned readings will be provided electronically or on hardcopy.
- Class notes from all lectures (except those lectures by guest lecturers) will be available as PowerPoint notes in PDF format.
- All electronic material will be available on WebCT Vista (webct.tamu.edu). To get onto WebCT you need to log on using your neo ID and password. To have WebCT work properly, you will have to allow popup windows (you can do it on WebCT pages only) and you might have to install the latest version of Java.

**Exams and grading**
- Four exams: 500 pts. (125 each)
- Oral and written presentation of scientific article: 150 pts.
- Review of scientific papers: 200 pts.
- Lab report: 100 pts.
- Attendance and classroom participation: 50 pts.
- Total: 1000 pts.

**Grades:**
- > 900 points: A
- 800-899 points: B
- 700-799 points: C
- 600-699 points: D
- < 599 points: F

**Examinations**
- First: Tuesday, September, 20
- Second: Thursday, October, 13
- Third: Thursday, November, 10
- Fourth: Monday, December 9 (12:30-2:30 p.m.)

**Lab report**
- A report of the lab activity from each of the lab group is due on November 29. Submission of a first draft is strongly encouraged and can be done at any time, even if some of the data are still to be collected. The report should be in the format of a scientific paper, following the guidelines of the American Society for Horticultural Sciences. The complete guidelines are available on the ASHS website (www.ashs.org) or on WebCT.

**Late assignments**
- Late assignments/term papers are penalized at a rate of 10% loss in points per day late including weekends.

**Examination policy**
- Students are expected to attend all classes and labs, complete assignments on time, and participate fully in class discussions and group projects. If an exam is not taken at the assigned time due to an excused absence, an oral or written (at the instructor’s discretion) make-up exam must be taken within 30 calendar days from the last day of the absence. If the make-up exam has not been preapproved and scheduled, the student will receive a “0” grade for the exam.
- If a student is caught cheating on an exam, the student will be given a “0” grade for that exam. Violations will be handled in accordance with the Texas A&M University regulations governing academic integrity.

**Changes in schedule**
- The instructor reserves the right to change the order and content of lectures as necessary. Exam dates (assignment/term paper due dates) may be changed by the instructor, but at least 7 days notice will be given.
| Americans with Disabilities Act (ADA) Policy Statement | The Americans with Disabilities Act (ADA) is a federal antidiscrimination 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 believe you have a disability requiring an accommodation, please contact the Dept. of Student Life, Services for Students with Disabilities in Cain Hall or call 845-1637. |
| Copyrights | Most handouts and supplements used in this course are copyrighted. This includes all materials generated for this class, including but not limited to syllabi, exams, in-class materials, review sheets, and lecture outlines. Materials may be downloaded or photocopied for personal use only, and may not be given or sold to other individuals. |
| Scholastic Dishonesty | As commonly defined, plagiarism consists of passing off as one’s own ideas, work, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, under the section “Scholastic Dishonesty.” |
October 2, 2006

MEMORANDUM

TO: Dr. Rick Giardino, Dean of Graduate Studies

Through: Dr. Michael Arnold, Associate Head for Graduate Studies

FROM: Dr. Leonardo Lombardini, HORT 601 Professor

SUBJECT: Catalog Description Change

The Department of Horticultural Sciences respectfully requests that a minor catalog change be permitted for HORT 601 Nutrition of Horticultural Crops. This modification results from a change of technology within the course.

Current description:
Principles of nutrition related to management practices of fruit, nut, ornamental and vegetable plants; practice in leaf nutrient analysis by atomic absorption and plasma emission spectrophotometry and autoanalyzer; development of skills in hydroponic nutrition research.

Proposed description:
Principles of nutrition related to horticultural plants; micro- and macronutrients; root uptake; short- and long-distance transport; management practices of fruit, nut, ornamental and vegetable plants; development of skills in nutrition research.

Please inform us whether this request may be accommodated through a catalog edit or if a “Change of Course” form needs to be submitted. You may contact me at l-lombardini@tamu.edu or 458-8079.

Cc: Dr. Tim Davis, Department Head
Dr. Gene Nelson, Dean
Ms. Linda Lacey, Director of Academic Support Services
Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional

1. This request is submitted by the Department of Civil Engineering
2. Course prefix, number and complete title of course: CVEN 628 Advanced Hydraulic Engineering

3. Change requested:
   a) Prerequisite(s): From CVEN 458 To CVEN 339
   b) Withdrawal (reason)
   c) Cross-list with
   Cross-listed courses require the signatures of both department heads.
   d) Change in course title and description. Enter complete current course title and current course description; complete proposed course title and proposed course description in items 4 and 5.
   e) Change in credit/contact hours. Complete item 6b. Underscore change(s). Attach a course syllabus.


6. a) As currently in course inventory:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN</td>
<td>628</td>
<td>Hydraulic Engineering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lect.</th>
<th>Lab</th>
<th>SCH</th>
<th>Subject Matter Content Code</th>
<th>Admin. Unit</th>
<th>FICE Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td>010366</td>
</tr>
</tbody>
</table>

Do not complete shaded area.

b) Changed to:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN</td>
<td>628</td>
<td>Hydraulic Engineering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lect.</th>
<th>Lab</th>
<th>SCH</th>
<th>Subject Matter Content Code</th>
<th>Admin. Unit</th>
<th>FICE Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
<td></td>
<td></td>
<td>010366</td>
</tr>
</tbody>
</table>

Approval recommended by:

Head of Department Date
Head of Department (if cross-listed course) Date
Submitted to Coordinating Board by:

Director of Academic Support Services Date Effective Date

* Attach a syllabus according to the guidelines on the Internet site www.tamu.edu/admissions/oars. To have this form reviewed, please send to Linda F. Lacey, Mail Stop 1265 or fax to 847-8737.