Plant Biology, BIOL 3150

Course objectives:
Upon successful completion of the course, students will
• Demonstrate knowledge of the basic structure and physiology of plants
• Demonstrate an understanding of the role of plants in global ecosystems
• Recognize the key features of major plants groups
• Appreciate the role of wild and domesticated plants in human cultures
• Appreciate the problems posed by invasive plants
• Demonstrate expertise in invasive plant management strategies

Instructor:
Dr. Carol Goodwillie
Office: Howell Science Complex Room S406
Email (preferred over phone for contact): goodwillie@ecu.edu

Required Textbook: Plant Biology
We will use a custom text for this course, created from chapters of existing McGraw Hill textbooks on general and plant biology.

Class sessions:
Classroom time will be used for lectures, in-class activities and discussions. Powerpoint lecture files will be posted by 10 am on the day of the lecture. Powerpoint files will contain minimal text information, so attendance in class and note-taking will be necessary to be successful in the class.

Exams and assignments:
Exams: There will be two hourly exams during the semester and one final exam. The final exam will cover the cumulative course material as well as some new material at the end of the course. Exams will consist of multiple choice, true/false, matching and some short answer questions.

Thanksgiving lunch: The Tuesday before Thanksgiving, we will have a botany banquet. Students will prepare a dish of some kind and identify the source (plant species and family) of all plants included.

In-class exercises: There will be approximately 11 short in-class exercises, worth 0.5 point each. These will generally NOT be announced in class, so you are encouraged to attend lecture
regularly to receive this credit. **The lowest in-class exercise grade will be dropped, for a total of 5 points.**

**Service-learning:** This course involves a service-learning component associated with the control of invasive plant species in our community. Invasive plants (aggressive species that have been introduced from another region) can displace native species and diminish the esthetic and ecological quality of the habitat. Several of these species have been identified by the Recreation and Parks Department as a problem for the management of Greenville parks and natural areas. Working with community partners in the Greenville Recreation and Parks Department and a non-profit group, students will be introduced to local invasive plant species, participate in physical removal of plants at local natural areas, propose a management plan for invasive plant control in these areas, and exchange ideas and knowledge with community partners. Basic concepts in plant biology presented in lectures, such as photosynthesis, nutrient uptake, and reproductive strategies, will inform students’ understanding of why certain plants become invasive and how they can be controlled.

**Service learning field work:** Students are required to participate in three local field trips to the Greenville greenways at times to be arranged. During these trips, students will gather data to assess invasive plant population densities and distribution, physically remove invasive plants, and observe, explore and learn about associated native plant species.

**Community partners:** On two to three classroom periods, students will have the opportunity to meet with representatives of community partners to discuss their service-learning work. Working in groups, students will present recommendations to community partners on how best to continue to manage specific invasive plants in Greenville natural areas at the end of the semester. Presentations will be evaluated by the following criteria: 1) effective use of graphical media, 2) clarity of spoken communication, 3) appropriate structure (introduction of species, management recommendation, rationale, conclusions), 4) responses to questions.

**Assessment of service-learning:** Upon completion of the course, students will have an opportunity to evaluate and comment on the service-learning experience and its contribution to learning and to the community. During the last class session, students will be asked to complete a questionnaire addressing:

- To what extent and how did the service-learning activities contribute to your understanding of course material on plant structure and function?
- In what ways, if any, has service-learning contributed to your professional development?
Discuss whether the service-learning activities have affected your views on invasive plants and the role of citizens as stewards of natural habitats

One-page written assignments: There will be four of these, due dates posted on syllabus. Three assignments will be associated with the service-learning component of the course.

Assignment 1: Summary and analysis of a journal article on invasive plant biology
Students will provide a two page summary and critical review of an assigned article from the primary literature on a local invasive plant (Lespedeza cuneata). Students will relate the reading to personal experiences in class field work.
Papers will be evaluated on the following criteria: 1) summary includes all major objectives, methods and findings of the study, 2) discussion identifies key strengths and weaknesses of the study, 3) a final paragraph is included that relates direct experiences with Lespedeza removal to the concepts addressed in the paper, 4) writing is grammatically correct and formatting is appropriate.

Assignment 2: Journal-style reflections on invasive plant removal
Students will write a three page journal-style account of their reflections and observations during service-learning field activities. Journals will be evaluated on the following criteria: 1) reflects on the personal challenges and/or rewards of the service-learning field work, 2) reflects on ways in which the process could be improved either in terms of student experience or community contributions, 2) includes natural history observations of local plants, 3) relates observations to lecture material in course, 4) writing is grammatically correct.

Assignment 3: Journal-style account of plant growth observations
Students will write a two page paper based on observations of growth of a bulb (materials provided by instructor). The paper will include observations made during the one-month growth process and a discussion relating observations to course material. Evaluation will be based on the following criteria: 1) provides detailed accounting of observations of root, leaf and flower structure and growth, 2) discusses the function of each plant part, 3) discusses the role of the bulb and other structures as sources and sinks in phloem transport, 4) writing is grammatically correct.

Assignment 4: Proposal for invasive plant management plans for Greenville greenways
Students will work in teams of three or four to write a four page proposal for management of a particular invasive plant in a Greenville natural area. The
proposal will draw on primary literature sources as well as personal observations and/or data from service-learning activities. Evaluation will be based on the following criteria: 1) discusses aspects of the species’ life history, reproduction and other biology and relates these to its degree of invasiveness, 2) summarizes management strategies available, 3) recommends the most suitable management strategy, and provides justification for recommendation, 4) incorporates field observations and/or data into management plan, 5) writing is grammatically correct.

**GRADING:**

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<thead>
<tr>
<th>Category</th>
<th>Points</th>
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<tbody>
<tr>
<td>Exams</td>
<td>54</td>
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<tr>
<td>Written assignments</td>
<td>20</td>
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<tr>
<td>In-class exercises</td>
<td>5</td>
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<tr>
<td>Participation in Service-learning field activities</td>
<td>15</td>
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<tr>
<td>Presentation to community partners</td>
<td>6</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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Tentative syllabus – lecture topics (28 total, 2 classes/week)

1. Intro to plants, invasive species, course intro
2. Introduction to service-learning and project, meet with community partners
3. Basic plant structures and tissue types/Assignment 1 due
4. Discussion of invasive plant biology paper
5. Photosynthesis
6. Photosynthesis cont’d
7. Transport in plants
8. Transport cont’d
9. Plant sensory systems/Assignment 2 due
10. Discussion of service-learning field experiences, exam review
11. EXAM I
12. Plant nutrition and soils
13. Plant nutrition and soils cont’d
14. Special trophic strategies in plants (parasitism, carnivory)
15. Plant defenses
16. Plant reproduction, sexual and asexual
17. Plant reproduction cont’d
18. Plant/pollinator interactions
19. Fruit and seed dispersal/Assignment 3 due
20. Plant diversity – seedless plants, gymnosperms
21. Plant diversity – angiosperm evolution
22. Plant diversity – major plant families
23. EXAM II
24. Origins of agriculture
25. Thanksgiving luncheon, discussion, plant trivia competition
26. Evolution of major crop species / Assignment 4 due
27. Meeting with community representatives, discussion of plant invasions
28. Wrap up discussion of service-learning experience, 20 minutes reserved for anonymous written evaluation of SL experience, review of material for final