

Curriculum Design for a Horticulture Class

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Horticulture, Landscaping, and Ecological Restoration 101

Course Goal: To gain knowledge about plant biology, soil chemistry, and basic horticultural and landscaping practices.

This curriculum design worksheet describes a horticulture course designed to teach students plant science and horticultural practice. This course will be taught with an inductive model. By providing students with the opportunity to immediately apply their learning, they will be motivated to learn because they will perceive a *need to know* (Prince & Felder, 2006). By affording the majority of class time to inquiry-based, hands-on activities, the learning environment will be student-centered (Milman & Kilbane, 2013). Students will first work collaboratively to solve a novel problem and then they will seek additional knowledge to explain their experience. It is assumed that this approach will be particularly effective with this student population as these students have not succeeded previously in a traditional, deductive instructional environment.

Traditional classrooms are centered on the acquisition of a specific set of learning outcomes. There is a one-way street in which the educator delivers the knowledge to be learned and the student absorbs it (Milman & Kilbane, 2013). There is little focus on why the knowledge is relevant but for many of these students survival is the framework for life. They have suffered through nights on the streets, family violence, and much more; a *need to know* must be central to the course design since there are much more pressing realities at stake than just getting an education for the sake of it. Furthermore, achieving a grade is assumed to be an insufficient motivator for these students who have already demonstrated the ability to fail in school. The motivation for learning must then be greater than the achievement of a grade. Therefore, this

course relies heavily on formative assessment that occurs during instructional time to guide the instructor in just-in-time teaching (Novak, 2011). In-class discussions and activities, reflective journals, and practical work experience are formative assessments in this course.

Goals and objectives

By the end of this course, participants will be able to:

1. Explain how plants perform the role of primary producers in ecosystems.
2. Identify common horticultural plants by family.
3. Apply plant biology concepts of differentiation and growth to horticultural practice.
4. Determine soil texture and fertility based on field tests.
5. Apply critical thinking skills to understand what ecological parameters are favored by a plant based on its morphology.
6. Employ technology tools to preserve learning experiences in portfolio form.
7. Perform landscaping and restoration tasks including planting, transplanting, amending soils, pruning shrubs and small trees, deadheading, weeding, hardscaping, and garden design.

Essential questions

1. What are primary producers? How do they harness the energy of the Sun for use by all biological organisms? What are the reactants and products of photosynthesis?
2. What are five families common to horticultural contexts? What morphological or ecological characteristics are common to each family?
3. How do you employ your understanding of plant differentiation and growth to pruning technique? Why would a gardener remove the dead flower sets of an angiosperm? Why

should some seeds be planted before last frost and some afterward; what two major categories of flowering plants describe this fact?

4. What are the names and relative sizes of the three main abiotic (mineral) particles in soil? What is the relative composition of particles in soils optimal for growth; what do you call this kind of soil? What are the three macronutrients needed by plants? At what time in the growing cycle do plants need each of these nutrients? What are three kinds of soil amendments you might use to fertilize soil in the garden; when would you use these amendments?
5. What are two adaptations of drought-tolerant plants; what advantage do these adaptations confer? What are two root designs and what are the advantages of each? Why would a plant expend so many calories to produce flower petals, which are not central to the photosynthetic process?
6. What is self-authoring? How can you use your portfolio in the future? How do you take a field picture or video and upload it to your Google+ site? How do you embed a video into a webpage; what are the advantages of embedding rather than hyperlinking videos? How do you resize a picture so it is 500 pixels square or less?
7. When planting, should the root ball be just above, just below, or level with the surface of the surrounding soil? When transplanting, what are the two most important steps to guarantee an easy move for a plant? How would you amend the soil in a mature flower garden? When pruning a shrub, should you cut just above or just below a node on a stem? Deadheading prevents what growth process from occurring; why does this increase blooming? When you are weeding an annual plant, what is the main goal in mind? When applying loose rock to a landscape, for example, for a pathway, how do

you know how much rock to buy? How do you guarantee that your garden design will have blooms for all seasons?

Summary of learning activities

1. Students will read a text related to the learning outcomes.
2. Students will participate in formative, hands-on, and inquiry-based classroom activities that reinforce the concepts in the reading.
3. Students will engage in real landscaping work for local non-profits, in schools, and in private gardens. In so doing, students will meet clients of varied perspectives.
4. Students will write reflective journal entries to consider their own learning process, to assess what questions still remain for complete understanding, and to reflect on the cultural intersections between plants and people.
5. Students will create an electronic portfolio to demonstrate their learning in the course.

Learning activities explored

Course Portfolio

By the end of this course, students will submit an electronic portfolio in Google+ that demonstrates their new professional knowledge about gardening and landscaping. This site will provide evidence of their knowledge to potential employers and future academic contacts. The process of self-authoring on the Internet will also provide practice with valuable technology skills that can be applied to any discipline or personal interest.

The course lecture materials are published in a Google+ site. They both provide students with learning materials for this course and model the expectation for the course portfolio. The

course portfolio will include a minimum of five components (one from each week). A rubric outlines the specific expectations for the course portfolio, which is the primary summative assessment for the course.

At the end of each class period, student will have some class time to work on their Google+ sites. At the end of the course, students will share their portfolios with each other.

Self-Reflection

Each week, students will write in a journal using the essential questions as writing prompts. This is a formative learning experience in which students will communicate with themselves and with the instructor about what they are learning, how this makes them feel, and what questions arise when they think more deeply about their learning experience.

In-Class Activities

Each week, students will work together to complete inquiry-based, hands-on projects that emphasize the learning outcomes. While these formative activities will require no writing or formal submission, they are excellent material for the final portfolio. While in class, students will be free to photo-document and take notes about anything that transpires with an eye towards including the activity in the final portfolio.

Field Component

Each week, the learning community will leave the school for roughly half of the scheduled class time to go visit gardens and do work applicable to careers in horticulture, landscaping, and ecological restoration. This real-world work experience can also be documented in the final portfolio.

Resources

1. The primary text for the course is Botany for Gardeners, by Brian Capon.

2. Botany Word of the Day: <http://plant-phytography.blogspot.com/?view=magazine>
3. Teaching Resources, Purdue University Botany and Plant Pathology department:
<https://ag.purdue.edu/btny/Pages/TeachingResources.aspx>
4. Scott's Botanical Links, University of Oklahoma: <http://www.ou.edu/cas/botany-micro/bot-linx/subject/sub-clas.shtml>
5. General Botany Lecture Notes, University of Miami:
<http://www.bio.miami.edu/dana/226/226F09.html>

Assessment activities

This course is designed for delivery as a roughly equivalent two-credit college course for high students attending an alternative high school in downtown Colorado Springs, CO. The purpose of assessment is to model the scholar process rather than qualify the student for passage into future courses. Relying heavily on the inquiry-based 5E Model of Science Instruction (Bybee et al., 2006; Bybee, 2009), the process of discovering knowledge in an experiential way is paramount to the design of the course. The associated rubrics for attendance and the final portfolio emphasize engagement in the process, completion of learning activities, and self-reflection opportunities for students. Essentially by taking this course, students are asking themselves “do I want to pursue a degree and/or career related to plants?”

The learning community that develops in this intensive course will provide the instructor with formative assessment opportunities such as evaluation of student responses to impromptu oral questioning, student demonstration of learning through hands-on application of knowledge, and students’ written reflections. Formative activities will not be graded directly with their own rubrics but student attendance will be required and measured with a daily attendance rubric that evaluates student presence and engagement in the course activities. In addition, students must

choose at least five learning experiences to document in their electronic portfolios. The final portfolio, the summative assessment of the course, will be assessed with a rubric. On the first day of class, the instructor will review the rubrics while introducing the learning activities to foreshadow the future expectations.

Journal writing will occur at the end of each class day. The journal prompts will include the essential questions of the course. While response to these questions will not be evaluated in a summative manner, each class day will begin with a review of the questions from the session before. Students will have the opportunity to self-assess and add information to answer questions they missed in the reflective journal writing from the session before. Journals will be assessed using the attendance rubric because participation in the essential questions discussion that occurs in class and student engagement are predicated on proper preparation, which in this case, involves completing the journal activity as the end of each class period. Journal entries can also be material for the final portfolio.

References

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