

Example Syllabus- GECC Life Sciences Panel Spring 2014

The two most difficult jobs the panel has are 1) Weeding through cell phone and attendance policies for the few required bits of information, and 2) assessing the general education requirements of breadth of topic, scientific inquiry, and integrated societal component without dictating exactly what they should look like in a course.

Effective Date: 2011 Fall

Prefix and Number BIO 100

Course Title PLANTS AND SOCIETY

The date of the materials tells the panel how recent the materials are. The panel needs to see materials within 5 years.

Contact Hours: 4 Lecture/Demonstration
2 Lab/Studio
6 Total contact hours per week
4 Credit Hours

The panel cannot approve a course in which there is insufficient seat time, or lab hours for the credit hours granted.

Prerequisite: 0000 555 High School Biology

The panel cannot approve a course that has a college-level prerequisite in the same discipline. High school biology or college chemistry are acceptable.

Catalog Description:

Course intended to satisfy a three credit life science general education requirement. Emphasizes scientific inquiry through selected concepts in biology, such as organization, function, heredity, evolution and ecology, using plants as the type of organism. Topics include plant chemistry, plant structure, growth, genetics, evolution, physiology, reproduction, and the importance and inter-relationships between plants and humans.

A catalog description is used to assess the general education requirements. The panel looks at breadth of topics, scientific inquiry, and societal component starting here, then compares this to the course objectives and weekly topical outline to ensure consistency.

Textbook:
Graham, Graham & Willcox Plant Biology Pearson-Prentice
Hall, 2005

The textbook is examined for appropriateness. Panel members know levels of books and whether or not a book is generally considered a “majors” book or a “general education” book. A course will not be rejected solely on the textbook, but it gives the panel some insight into a course and is required information, so the panel will return a submission for more information.

Method(s) of Assessing Student Outcomes: Pre and Post Quizzes, Lecture Exams, Lab Exams, Lab Notebook, Current Event Plant Assignments, Peer Evaluation of Notebook, Field Trip Report, Lab Review Assignments.

Methods of assessment are used to assess the general education requirements. In this example, there are “Lab Notebook, Field Trip Reports, and Lab Review” which indicate the scientific inquiry component, and “Current Event” assignments which indicate some societal component. The panel cannot reject a course because of assessments, but again, they give the Panel insight into a course so the panel will return the submission for more information if they are missing.

Weekly Topical Outline Examples:

EXAMPLE 1

Week 1- Chapter 1, Lab 4
Week 2- Chapter 2, Lab 2
Week 3- Chapter 4, Lab 18
Etc.

Noone knows what these mean except the course instructor. This is unacceptable as a Weekly Topical Outline, and a submission like this will be returned.

EXAMPLE 2

WEEK	CHAPTER	LECTURE	LAB #	LAB TOPIC
1	1 2	What is Plant? The Nature of Life	1	The Microscope
2	3	Cells	2	The Cell
3	10	Plant Metabolism	10	Photosynthesis
4	4 5	Tissues Roots and Soils	4	Roots
5	6	Stems	5	Stems
6	7	Leaves	6	Leaves
Etc.				

This is a better example, but still has very little detail. What topics does "Tissues" include? The lab detail is worse here: What do you do in a lab called, "The Cell" or "Roots"? This will also be sent back for more information.

1. The Microscope
 - a. Description of the parts of a compound microscope, and understand the function of each part.
 - b. Description of the differences and similarities between a compound microscope and a dissecting microscope.
 - c. Calculation of magnification, with specific combinations of lenses, of each object being viewed.
 - d. Explanation of what is meant by resolution, field, and depth of field.
2. The Cell
 - a. Identify the various components of living cells visible with a light microscope.
 - b. Learn the difference between cyclosis and independent movement of microscopic objects.
3. Photosynthesis
 - a. Understand the requirements for the oxygen-generating steps of photosynthesis and how to test for this in the aquatic plant Elodea.
 - b. Understand the light requirements of photosynthesis and the meaning of fluorescence.
 - c. Understand and be able to perform the steps involved in an experiment to demonstrate the correlation between the presence of starch and photosynthetic activity in a Coleus leaf. Also be able to write up the experiment in appropriate fashion, according to the instructions given for writing up a scientific report in Exercise 7.
 - d. Perform paper chromatography using plant pigments.
 - e. Learn the role of carbon dioxide in photosynthesis and fluorescence in chlorophyll.
4. Roots
 - a. Observe the differences between root hairs and lateral roots.
 - b. Observe root tissues such as epidermis, cortex, endodermis, pericycle, phloem, and xylem.
 - c. Describe the location and composition of Casparian strips.

Added in this submission were these detailed lab descriptions. These helped the panel to see what actually happens in the lab and what the outcomes are. With these descriptions, the panel can see that there are scientific literacy outcomes, and the skills and outcomes present in the lab, as well as the breadth of topics covered. Sometimes, the panel can even see societal components in these descriptions.

EXAMPLE 3

1. The Plant Cell
 - a. The Cell Wall
 - b. Membranes / Organelles
 - c. Nucleus
 - d. Cell Cycle / Mitosis
2. The Plant Body
 - a. Plant Tissues
 - i. Stems / Roots / Leaves
 - ii. Vegetables: Edible plant organs
 - iii. Photosynthesis
 1. Pigments
 2. Light Reaction
 3. Calvin Benson Cycle
 4. C3,C4, Cam
3. Plant Life Cycle: Fruits and Seeds
 - a. Fruit Types
 - b. Seed Structure and Germination
 - c. Edible Fruits: Tomato, Apple, Orange, Chestnut, Exotics
4. Feeding a Hungry World
 - a. Breeding for Crop Improvement
 - i. High Yield Varieties
 - ii. Disease-Resistant Varieties
 - b. The Green Revolution: Problems and Solutions
 - c. Genetic Diversity
 - i. Monoculture, Sustainable Agriculture, Genetic Erosion, Seed Banks
 - ii. Heirloom Varieties, Germplasm Treaty
 - d. Alternative Crops: Quinoa, Amaranth, Tarwi, Tamarillo, Naranjilla
 - e. Biotechnology
 - i. Cell and Tissue Culture
 - ii. Molecular Plant Breeding
 1. Transgenic Plants: Herbicide Resistance, Insect Resistance, Bt Corn, Golden Rice
 - f. Pharming – Pharmaceuticals
 - g. GM Trees
 - h. Regulatory Issues
 - i. Environmental and Safety Concerns

This example is the best for a lecture outline. There are enough details for the panel to see that there is some breadth of topics (cells, cell reproduction, photosynthesis, structure/function, genetics) and what biological content is being focused on in each week, see some scientific literacy problem solving (in blue), and see that there is obvious integration of societal components as part of most units (in yellow).

EXAMPLE 4

Course Objectives:

- A. Prepare and examine specimens of plants using the microscope.
- B. Analyze the parts of vascular plants, including organelles and flower parts.
- C. Examine the role of the major organic compounds in the structure and physiology of plants.
- D. Differentiate the known mechanisms by which material enters and leave plant cells.
- E. Examine the roles of enzymes and analyze specific examples from respiration and from photosynthesis.
- F. Compare and contrast aerobic and anaerobic respiration.
- G. Diagram the steps in the light reactions of photosynthesis.
- H. Differentiate between the 3-carbon pathway and the 4-carbon pathway of photosynthesis, and how it is important.
- I. Diagram and explain the steps of mitosis and meiosis.
- J. State the basis of biological classification and give examples of members of each kingdom studied.
- K. Describe the structure, physiology, reproduction, and importance to humans of each of the following: bacteria, viruses, fungi, protists, bryophytes, seedless vascular plants, and seed plants.
- L. Identify organisms to phylum.
- M. Identify angiosperm plant structures and cell types.
- N. Explain how flowers and fruit develop.
- O. Identify and understand the primary and secondary growth structures of a vascular plant.
- P. Understand the role of internal and external environmental factors in the growth and survival of vascular plants.
- Q. Understand general ecological principles in terms of biomes and ecosystems.

These course objectives were from the same syllabus as the course outline below. The course objectives look great, covering a breadth of topics in molecular and organismal biology, and maybe some scientific inquiry. However, when coupled with the course outline, the panel saw that the majority of the course (18/25 units) was focused on taxonomy and structure/function of plants rather than having an equal distribution across the topics in the outcomes. The panel rejected this course because of the inconsistency between the outcomes and outline, and the lack of breadth. There is only 1/25 units (the final one) that has to do with society, and that is not enough to be approved as a general education course.

Course outline:

- 1. Botany Overview
- 2. Introduction to the Plant Cell
- 3. Plant Cell and Cell Cycle (mitosis)

4. Reproduction in Cells (meiosis)
5. Photosynthesis
6. Systematics and Biological Diversity
7. Kingdom Monera: Cyanophyta
8. Kingdom Protista: Primarily Unicellular Organisms
 - i. Chrysophyta
 - ii. Apicomplexa
 - iii. Pyrrophyta
 - iv. Euglenophyta
 - v. Rhizopoda
 - vi. Ciliophora
9. Kingdom Protista: Primarily Multicellular Organisms
 - i. Algae
10. Division Chlorophyta
11. ii. Division Phaeophyta
12. iii. Division Rhodophyta
 - i. Protists Resembling Fungi
 - ii. Division Myxomycota
 - iii. Division Acrasiomycota
 - iv. Division Oomycota
13. Kingdom Fungi
 - i. Division Zygomycota
 - ii. Division Ascomycota
 - iii. Division Basidiomycota
 - iv. Lichens
14. Kingdom Plantae: Division Bryophyta (Bryophytes)
 - i. Class Hepaticae
 - ii. Class Anthocerotae
 - iii. Class Musci
15. Kingdom Plantae: Seedless Vascular Plants
 - i. Division Psilotophyta
 - ii. Division Lycophyta
 - iii. Division Sphenophyta
- iv. Division Pterophyta
16. Kingdom Plantae: Gymnosperms (Exposed Seed Plants)
 - i. Division Cycadophyta
 - ii. Division Ginkgophyta
 - iii. Division Coniferophyta
 - iv. Division Gnetophyta
17. Kingdom Plantae: Angiosperms (Enclosed Seed Plants-
18. Flowering Plants)
 - i. Division Anthophyta
19. Early Development of the Plant Body
20. Cells and Tissues of the Plant Body
21. The Root
22. The Shoot
23. Secondary Growth in Stems
24. Ecology and Adaptation
25. Ethnobotany/Economic Botany

EXAMPLE 5

Be able to correlate plant structure/organs with function.

Competencies:

1. Identify cell and tissue types of plants such as meristem, dermal tissue, etc.
2. Describe the basic anatomy of roots, shoots, leaves and flowers.
3. Be able to explain the function of roots, shoots, leaves and reproductive structures in vascular plants.
4. Describe the role of mineral nutrients in plant growth.

Assessment:

This outcome will be assessed using instructor generated quizzes or exam(s), homework assignments, and research report.

Explain our dependency on the plant kingdom to sustain human life.

Competencies:

1. Discuss plants as a source of food for humans, both currently and historically.
2. Discuss other non-food plant uses by humans, such as building materials, textiles, medicinal uses, and genetically engineered substances.

Assessment:

This outcome will be assessed using instructor generated quizzes or exam(s) and research report.

Discuss examples of plant ecology.

Competencies:

1. Explain the role of plants in natural cycles.
2. Describe plant population biology including succession and biomes.
- 3: Explain the interrelationships between plants and the environment such as the greenhouse effect and ozone depletion.

Assessment:

This outcome will be assessed using instructor generated quizzes or exam(s) and homework assignments.

Describe plant classification, evolution, and reproduction, including non-plant organisms traditionally covered in botany.

Competencies:

1. Explain how living things are classified.
2. Describe characteristics of the photosynthetic Monera, Fungi, Protists, vascular and nonvascular plants.
3. Describe the life cycle of the above plant types.
4. Explain the evolutionary relationships between the above groups.

Assessment:

This outcome will be assessed using instructor generated quizzes or exam(s).

This is another good example of outcomes/topical outline. The panel would also require a weekly outline in addition, but this gives course outcomes and shows the relationship between student outcomes and assessments. The panel can clearly see what the course is aiming to do. This outline does not show any scientific inquiry or societal components, though.