Internationalizing the Curriculum Project

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BIO108 Plants and Society—4 Credits

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- Course Description: The study of plants in relation to humans; as a source of food, fiber, drugs, and other products; for aesthetic value, survival, and energy.

  The study of plants as a source of food, fiber, drugs, and other products requires students to visit ethnic grocery stores, use the Internet for international articles on plants or plant products, and to find recipes, complete a medicinal plant research paper, and other exercises exploring the chemistry and cellular structure of plant varieties from around the world.

- Required Text: *Plants and Society*, 1999 McGraw-Hill, 2nd Ed. ISBN 0-697-34552-1
  Study Guide for Plants and Society, Mickie Bond. 1999, 3rd Revision
  Lab Manual for Plants and Society, Mickie Bond. 1999, 3rd Revision

International Component Summary

New World/Old World origin on Selected plants, Migration of plants with people to produce The Global Village. Introduction to organic chemistry using red chile peppers as Model plant. Human population growth and Doomsday predictions regarding food Production. Grains and Legumes as "best bet" for high calorie production. Problems with getting people to eat "new" foods. Medicinal plants as used in ancient Medicine and modern herbal medicine. Bioengineering and the possibility that we might be able to increase our plant yield to keep up with our population growth.

Special Assignments and Activities

Instructor

Arranging computer lab introduction for 100 students in order to use POLIS (Project for Online Instructional Support).

Preparing three elaborate special project assignments in time for students to use them.

Organizing each of the four labs into six functioning groups that could clean, plant, and tend their garden plots.

Students

Accomplish one to three off-campus extra credit exercises (Example; Ethnic Grocery Store).

Gardening the outside plots with fair distribution of labor

Medicinal Plants paper

Harvest of lab and oral student presentations

Successess and Special Challenges

Successes: Most students like the course material and say so. They also identify the parts they don't like as well (typically Grains and Legumes). Challenges: Finding enough time to get the material within the timeframe.

Tips/Suggestions to Instructor

1. Use the knowledge and experience of all the foreign students you have. Try to have them participate often in lecture.
2. Encourage your students from "other" parts of the U.S. to speak up in lecture. This will often produce some excellent comments.
3. Try and form your lab groups on the first or second lab meeting. Get the students outside even if the weather doesn't permit planting. As they bond with each other they will bond with their plot and the whole class will benefit from the mixture.
4. Take advantage of any unusual local nurseries, museums, festivals, and etc. or use for additional "picker-uppers"
5. Don't worry if nothing grows very well. I can help you identify some "back-up" seeds if the first ones don't work.
6. Try and tolerate your Obsessive/Compulsive, students the garden is often harder for them. They often do not work well in a group but work well with an individual plot.

Resources

Required text, study guide, and lab manual
One large laminated world map with current countries (to hang in lab)
One large laminated world map showing geographic biomes (to hang in lab)
Fresh material in each lab to add life and sparkle
Tasting samples that match lab whenever possible (example; blue corn chips).
Internet: Student use is reflected in their use for obtaining references and retrieving assigned information
State of the World information from text and disc
POLIS: Each of the five units has netscape links available for exam study
See suggested links (POLIS) with earth unit

(Syllabus begins next page.)

INTRODUCTION
BIO 108 PLANTS and SOCIETY

4 credit Natural Science Course for Non-Majors
(3 Periods lecture / 3 Periods Lab per week)

Phoenix College is a centrally located urban community college. Most of the students are working toward some type of Bachelor's degree and require 8 credits of transferable science. BIO 108 has a wide appeal for non-biology majors because (1) it has no prerequisite, (2) it is highly recommended through the Advisement Department and (3) the course content is popular. The typical day enrollment for this course is 100 students. Night enrollment is limited to 50 students. The instructor actively recruits interesting and unusual students which results in many foreign students and many ADD students. All students know they are expected to assist others when necessary. This works out very well.

There are five Units in the semester. Each ends with a 100 point exam. Weekly labs are worth 20 points. Each Unit last about 3.5 weeks and corresponds with 3 labs. The match is, of course, better on some than with others but here are samples of the 5 Units and at least 1 "matching" lab.

UNIT I - OLD WORLD / NEW WORLD - WORLD HISTORY OF FOOD

Study Guide -12 pages

We begin with the history and origins of specific food. Many students have a poor working concept of the world geography so maps and places on maps are initially very important. For example, Afghanistan, Old World, almost always is in the current news for either a skirmish or a natural disaster. It is also the original home of the carrot. That's back when carrots were purple! In a corresponding laboratory students see and taste various foods and identify them as Old World or New World. They can use the SEED SAVER'S CATALOG to order purple carrot seeds if they have a home garden and a curiosity. This, like all the labs is an "up and moving" exercise and gives the students a change to get acquainted. A popular vegetable, but not well known in Arizona, is OKRA. In lecture we talk about it being of Old World origin (Africa) and being brought over as seeds by slaves. First it came into the Caribbean and then into the Carolinas and finally into Louisiana. It is a main ingredient in an unusual New Orleans stew/soup called GUMBO. We look at the fresh plant and also have enough for everyone to have a taste of the fried product. (Church's Fried Chicken makes exceptionally good fried okra.) During this first Unit we pass around several plants during lecture to use in memory tricks to learn scientific names (ex. Carrot - Daucus carota) Squint your eyes and see the word carrot! Many reading assignments in the text are included. Most are pages long and reappear on the Hour Exam. Sample URL assignments at computer center:

http://winnie.ascu.buffalo.edu/potatoe/
http://countrylife.net/ethnobotanv/
http://ag.arizona.edu/bta/

As part of Unit I, we also did our first try on the POLIS set-up. It was fairly successful. I had the students mail the URL of their choice of one ethnic recipe from the Berkley SOAR website. I'm sure this will stay for next semester and due to popular student demand I left it up. It's listed under POLIS (Course listing on P.C. website....or my page) as International Recipe. Just keep on paging down to the bottom and you will find the ethnic recipes. Some really nice ones. Many of the students were surprised to find their heritage groups listed with so many recipes.

UNIT II - PLANT CHEMISTRY and CAPSICUMS

Study Guide 29 pages

The lectures cover introductory identification of selected elements and chemical structures. Carbohydrates, fats, lipids and proteins are stressed. The red chile pepper is used as the example for the chemical structure and to make the connection between the effect (hot -capsaicin), color (red -capsicum) and three dimensional chemical model. Peppers are constantly on display in all the labs in this unit. The origin of chile peppers in Mexico, making it a New World plant, and its rapid, permanent and global acceptance is used as the thread to hold the chemistry segment together. Because of potential problems of handling peppers in the laboratory, the lab in this Unit centers on a sweeter topic. The sugar lab is as international as only sugar can be. Sugar can come from many places and from several types of plants but when you get it in your body it is still "plain old sugar". We use diabetic dip-stix to test exactly what kind of sugar we have. It could be beet sugar from India, cane sugar from Hawaii, turbinado sugar from Mexico. The truth is in the dipping! An additional part of a Unit ll. Lab is testing for starch. Iodine and starch makes a distinctive black color. Pastas, gamesas, jasmine rice will all test positive for starch. In point comes across very well that starch, in the body, in international and intercultural.

Text readings assigned throughout. Black Pepper (Old World) and Red Pepper (New World). Sample assignments at the computer center:

http://www.spicesetc.com/julvspice.html
http://www.mohotta.com/apicko.htm
http://desert.netlseeds/home.htm

"Intro to the Chemical Elements" sung by Tom Lehrer (in lecture about elements) "Java Jive" sung by Manhattan Transfer before coffee lecture.

UNIT III - CEREALS and LEGUMES

Study Guide -15 pages

Unit III is the "Doomsday Unit". Going back to Malthusian predictions and then up to information as listed in the current State of the World, the students are primed for consideration on how to get out of this predicament. This is encouraged for class discussion. Lecture emphasis is placed on three main GRAINS (Wheat, Corn, Rice). The major world areas that consume these Grains are discussed. Soybeans are considered separately. Particular attention is paid to developing trade in soybeans between the U.S.A. and China for use as animal food. The increased standard of living in China, allowing more animal protein in their diet, is considered. One lab in this Unit involved handling and viewing as many types of Grain, Corn, Rice, Soybeans and Legumes as I could find. The size between a big dried Lima bean and a tiny Amaranth seed is quite remarkable. Amaranth is high in protein and is popular in South America. It was a major grain of the Aztecs. They especially liked it mixed with blood. It grows almost everywhere as a 3-5 foot weed, usually called "pigweed" or "careless weed".

Reading assignments ongoing in text.

STATE OF THE WORLD -1998 - Book
Recommended rental movie - "The Story of Qui Ju or Qui Ju Goes To Court"
State of the World http://www.worldwatch.org
Anatomy & Physiology of Wheat, Rice, Corn, Legumes
Emphasis on Pellegra during 1930's and historical treatment by Aztecs

UNIT IV- MEDICINAL PLANTS

Study Guide - 28 pages

Beginning with a historical survey of humans and medicinal plants, 60,000 B.C. Neanderthal and moving up through 2,000 B.C. and Emperor Shen Nung who had a cure for leprosy to Greek physician Hippocrates (Hippocratic Oath - "Physician, first, do no harm") also an Ayurvedic sample from India and finally Holistic and Alternative medicine of current time. Selected plants medicines are examined and discussed for pros and cons. Malaria is used for examination because it is so widely spread in the world, has such a well documented history and is still best treated with a plant product (quinine). One lab in this Unit is the International Campus Walk, Tailored each semester it provides each student to see their campus plants in a new way. Working in groups, with an Exercise Book and a Taxonomic Key, they identify plants as to country of origin, and answer specific question like color of flower. If there is a medicinal use for the plant that is noted in the Exercise Book. The number of plants varies with the season but is usually between 35-43. Another lab in Unit IV is a lab with 30 medicinal products with 4 questions each. Some are Herbal and are packaged in capsules, like Saw Palmetto, the herbal Viagra. Other are fresh material like Ginkgo leaves, supposedly good to enhance memory or celery, a fine traditional diuretic. Many fresh and packaged herbal medicines are seen in lecture and lab. 100 points Medicinal Plant paper support this unit. Medicinal history of drugs moves through Neanderthal - Babylonia - China - Greece India Selected assignments in computer lab:

http://www.malaria.org.za
http://hanwei.com/culture/medic.htm

UNIT V -- GENETIC ENGINEERING

Study Guide -12 pages

Emphasis is placed on two areas:

1. Is it ethical to change the DNA of plants in order to increase their productivity and try to feed the world?
2. Have we done this already? What may be the repercussions?

The answer to #2 is TRUE. The answer to #1 will be made open to discussion.

One lab in this Unit will require a discussion from each of the 6 groups in the lab. Questions will be distributed. Groups may exchange questions if desired. All members of the group must participate. POLIS guidance is available.

Selected assignments from the computer lab:

http://hawaiiag.org/harc/
http://image.fs.uidaho.edu/
http://www.geocities.com/Athens/Olympus/4338/index.html
http://webzonel.co.uk/www/wtproject/geneng0.htm

EXTRA CREDIT

OPTIONAL - 20 points each

ETHNIC GROCERY STORE- Students go to any ethnic grocery EXCEPT one of their own cultural background. They fill out a questionnaire about the types of items for sale and make a small purchase (less than $1). A suggested list of groceries near the school is provided but any one is O.K. The receipt is stapled to the completed questionnaire for validation .

THE FARM INSTITUTE AT SOUTH MOUNTAIN - A functioning organic garden operates just S. of Southern Ave. and 32nd St. The student must follow a map around the garden and complete The questions. For example: What are the dried items hanging from the porch roof? Answer: Artichoke flowers. There is no charge for going through the garden and the student interns from ASU are friendly to our students. An excellent cafe that uses much of the garden produce is located on the grounds. The setting is an old pecan grove and the pecan pie is outstanding. The bus stops about a block away from the entrance. This is always a popular stop.

PHOENIX DESERT BOTANICAL GARDEN - Students are given a set of blanks that they use to write statements about selected areas in the Botanical Garden. Included is the URL for the garden which contains the city map and garden overview. Rosters are submitted to make admittance available to them for $2.00 rather than the usual $7.50. For example: Succulent House - Student will write two statements about any two plants that are appealing.