Curriculum Proposal Cover Sheet

LSC Use Only Proposal No: LSC Action-Date:	*UWUCC Use Only* Proposal No: 13-105 UWUCC Action-Date: AP-11/19/13 Senate Action Date: APP-12/3/13 APP-11/4/14

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

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Check all appropriate lines and complete all information. Use a separate cover sheet for each course proposal and/or program proposal.

1. Course Proposals (check all that apply)

____ New Course ____ Course Prefix Change ____ Course Deletion

__X__ Course Revision __X__ Course Number and/or Title Change __√__ Catalog Description Change

Current course prefix, number and full title: **BIOL 210 Botany**

Proposed course prefix, number and full title, if changing: **BIOL 210 Principles of Plant Biology**

2. Liberal Studies Course Designations, as appropriate

____ This course is also proposed as a Liberal Studies Course (please mark the appropriate categories below)

____ Learning Skills ____ Knowledge Area ____ Global and Multicultural Awareness ____ Writing Intensive (include W cover sheet)

____ Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)

____ Global Citizenship ____ Information Literacy ____ Oral Communication

____ Quantitative Reasoning ____ Scientific Literacy ____ Technological Literacy

Received NOV 12 2013 Liberal Studies

3. Other Designations, as appropriate

____ Honors College Course ____ Other: (e.g. Women's Studies, Pan African)

4. Program Proposals

____ Catalog Description Change ____ Program Revision ____ Program Title Change ____ New Track

____ New Degree Program ____ New Minor Program ____ Liberal Studies Requirement Changes ____ Other

Current program name:

Proposed program name, if changing:

5. Approvals	Signature	Date
Department Curriculum Committee Chair(s)	Megan Knoch	10/21/13
Department Chairperson(s)		10/21/13
College Curriculum Committee Chair	Anne Rodolfa	11/8/13
College Dean		11/8/13
Director of Liberal Studies (as needed)		
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs	Gail S Sechrist	11/19/13

Part II. Description of Curriculum Change

1. Syllabus of Record

I. Catalog Description

BIOL 210 Principles of Plant Biology 2c-31-3cr
Prerequisites: BIOL 201,203

Explores the diversity, form, and function of vascular and nonvascular plants. Focuses on the evolutionary innovations that distinguish different taxonomic groups of plants. Topics include plant anatomy and physiology, growth and development, plant classification, plant ecology and genetically modified foods. Discusses ways that plants are important to humans, ranging from food and lumber to sequestering carbon dioxide. Provides an in-depth exploration of crop plants, including the science of biotechnology.

n. Course Outcomes

Students will be able to:

1. Identify important concepts in the diversity of plant structures for acquiring and retaining water, exchanging gases, optimizing photosynthesis, and supporting growth and reproduction.

2. Explain important concepts in the development plant form relevant to *in vitro* culturing, meristem activity and differentiation including the influence of external and internal cues.

3. Describe the cycles of matter and energy transfer in ecosystems as it relates to plants and to plants' role in the biosphere.

4. Evaluate the importance areas of plant science as it relates to genetically modified foods and crop biotechnology.

5. Use the scientific method and report findings by writing a scientific paper.

III. Detailed Course Outline

Lecture Schedule

A. Introduction to plant biology

1. The scientific method/introduction to plants and classification 1 hr
2. How are plants organized?
    a. Shoot system, root system/concepts in genetic engineering lhr
    b. Chemical constituents of plants: carbohydrates, lipids, secondary

metabolites

3. Plant cell structure 1 hr
   a. Cell wall, vacuoles, plastids
   b. Chloroplast and stomata
4. Cell types, tissue, and organ system of vascular plants 1 hr
   a. Parenchyma, collenchyma, and sclerenchyma
   b. Meristems
   c. Vascular tissue, wood
   c. Roots and shoots
   d. Shoots and leaves
5. Flowers, fruits and seeds 1 hr
   a. Flower structure
   b. Fruits and seeds
   c. Seed dispersal

Exam 1 1 hr

B. Plant cell function

1. Plant water relations 2 hr
   a. Water uptake, osmosis and water potential
   b. Transpiration
   c. Opening and closing of stomata
   d. Nutrient uptake
2. Plant responses to external stimuli 2 hr
   a. Phytochromes
   b. Photoperiodism
   c. Plant hormones and growth regulators
3. Photosynthetic carbon fixation and metabolism 2 hr
   a. Role of light in photosynthesis
   b. Chloroplast, C3, C4, and CAM metabolism
   c. Environmental aspects of photosynthesis

Exam 2 1 hr

C. Plant biotechnology 2hr
   a) Plant breeding
   b) Ti-Plasmids
   c) GMO's and crop plant.evolution

D. Plant-fungi interactions 2 hr
   Fungi: an overview
   a. Fungi: interactions of plants and fungi: the evolution of their parasitic and symbiotic relations 1 hr
   b. Fungi: fungal reproductive structures and heterokaryosis 1 hr

Exam 3	1 hr
E. Plant systematics: plant life cycles and alternation of generations	2 hr
1. Single-celled plants plant-like protists; alagal protists	1 hr
2. Non-vascular plants	
a. Bryophyte	1 hr
3. Seedless vascular plants	
a. Ferns and their relatives	1 hr
4. Non-flowering seed plants	1 hr
a. Gymnosperms	
b. Human relevance of gymnosperms	
5. Flowering seed plants	2 hr
a. Flowers	
b. Pollination ecology	
c. Flowering plants and civilization	
Final Exam	2 hr

Lab Schedule

Week 1	Applications of the scientific method & seed planting
Week 2	Plant tissue culture (callus initiation and micropropagation)
Week 3	Microscopy, staining, observation of living plant cells and plastids
Week 4	Plant tissues—locate, identify, and relate the function of each tissue type
Week 5	Vegetative and functional anatomy of vascular plants-- the root/stem/leaf
Week 6	Photosynthesis
Week 7	Plant water relations-long distance transport in plants
Week 8	Control of plant growth and development--photoperiodism
Week 9	The fungi/mycorrhiza/lichens
Week 10	Algae/bryophytes/ferns
Week 11	Flowering plants
Week 12	Plant biotechnology—GMO's Part 1
Week 13	Plant biotechnology---GMO's Part 2
Week 14	Plant biotechnology data analysis

IV. Evaluation Methods

25% Lab: lab grades will be based upon a mix of quizzes, lab reports, and lab exercise summaries.
50% Exams
25% In class assignments or homework: an example would be points associated with reading and answering questions on articles from plant science journals; section on applications of plant biotechnology and biosequestration by plants

V. Example Grading Scale

$\geq$ 90% A; 80 – 89% B; 70 – 79 % C; 60 – 69% D ; < 60% F

VI. Undergraduate Course Attendance Policy

The attendance policy will be in accordance with University guidelines as outlined in the undergraduate catalog.

VII. Required Textbook(s), Supplemental Books and Readings

Bidlack, J., and Jansky, S. 2012. *Introductory Plant Biology*, 13th edition. McGraw Hill, New York, NY.

Non-textbook reading:

1. Kyozuka, J. 2009. Control of shoot and root meristem function by cytokinins. *Current Opinion in Plant Biology* 10:442–446.

2. Thomann, E.B., Sollinger, J., White, C., and Rivin J.C. 1992. Accumulation of Group 3 late embryogenesis abundant proteins in *Zea mays* embryos -- Roles of abscisic acid and the viviparous-1 gene product. *Plant Physiol* 99: 607-614.

3. Whitman, D. 2010. *Genetically Modified Foods: Harmful or Helpful?* CSA Discovery Guides http://www.csa.com/discoveryguides/discoveryguides-main.php.

VIII. Special Resource Requirements

None.

IX. Bibliography

Graham, L. E., Graham, J.M., and Wilcox, L.E. 2003. *Plant Biology.* 4th Edition. Prentice Hall, Upper Saddle River, NJ:

Mauseth, J.D. 2003. *Botany: An Introduction to Plant Biology*, 3rd Edition. Jones and Bartlett, Boston, MA.

Nobel, P.S. 2009. *Physicochemical and Environmental Plant Physiology*. Academic Press, Oxford, UK.

Rost, T.L., Barbour, M.G., and Stocking, R.C. 2006. *Plant Biology*. 2nd Edition. W. H. Freeman and Company, NewYork, NY.

Stewart, C.N. Jr. 2009. *Plant Biotechnology and Genetics: Principles, Techniques and Applications*. John Wiley & Sons, Hoboken, NJ

Wickens, G.E. 2004. *Economic Botany: Principles and Practices* 3rd edition. Kluwer Academic Publishers, Netherlands.

2. A Summary of the Proposed Revisions

1. The course title is changed.
2. The course is being changed from a studio format to a lecture/lab format.
3. The syllabus of record is being updated.
4. The evaluation methods are being updated to reflect the new lecture/lab format.

3. Justification/Rationale for the revisions

1. The course title is being changed to incorporate recent advances in plant biology for integrating complex mechanisms in cellular processes and genetics for designing new plants. For example, some genetically modified plants are developed as biological sensors for pollution while other plants are being modified to improve crop yield and resistance to disease.

2. The course is being changed from a studio format to a lecture/lab format in order to accommodate more students with limited faculty resources.

3. The syllabus of record is being updated.

4. The evaluation methods are being updated to reflect the new lecture/lab format.

4. Old Syllabus of Record (attached)

Part III. Letters of Support or Acknowledgment

None

Course Syllabus

I. CATALOG DESCRIPTION

BI 210 Botany — 3 credits, 5 lecture/lab hours (2c-3l-3sh)

Prerequisite: BI 111 and 112 or permission of instructor.

A survey of the major plant groups, their physiology, structure, life cycles, evolution and ecology, and economic roles of plants. Combined lecture-laboratory.

II. COURSE OBJECTIVES

Students will:

1. develop an appreciation of plants as organisms which integrate structure with function.
2. develop an appreciation of plants as organisms which evolved to fill certain essential roles within the biosphere.
3. appreciate the importance of the ecological roles filled by plants in various ecological habitats.
4. gain an appreciation of the ecological and economic importance of plants to humans and human society.
5. be able to recognize representatives of the important major plant groups.
6. understand how plants have evolved solutions to the problems of multicellular life in their own unique ways.
7. appreciate the importance of the welfare of the local and world-wide plant community as being essential for local and global environmental well-being.
8. create an awareness of important areas of plant science that are open to scientific investigation.
9. demonstrate the importance of plant science as a human endeavor and to plate it in proper perspective *vis a vis* the other sciences and other human activities.

III. COURSE OUTLINE

Course Introduction and Propagation and Care of Plants (2 1/2 hours)
- Propagation
  - by seed
    - requirements for germination
    - planting
  - by spore
    - requirements for germination
    - planting
  - by vegetative means
    - cuttings
      - herbaceous
      - hardwood
    - bulbs, corms, tubers and roots
- Growing Plants
  - requirements
    - light
    - temperature
    - water
    - nutrients
      - soil
      - hydroponics
  - support
  - care
    - trimming
    - repotting
    - pest control

Structure of Plant Cells (5 hours)
- review of eukaryotic cell structure
- special features of plant cells
  - cell walls
    - composition
      - cellulose & chitin structure
    - cell wall structure
  - plastids
    - plastid developmental cycle
    - chloroplast structure
    - chromoplasts
    - storage plastids
      - amyloplasts
      - proteoplasts
      - elaioplasts
  - vacuole

- tonoplast
- content of vacuoles
- vacuole function

cellular specialization within plants (cell types and tissues)

- parenchyma cells
  - storage
  - epidermal
  - secretory
- support cells
  - collenchyma
  - schlerenchyma
- vascular cells
  - xylem
  - phloem

simple and complex tissues

<u>Plant Organs (5 hours)</u>

primary structure - internal and external anatomy

- root
- stem
- leaf
- primary meristems

secondary - internal and external anatomy

- secondary meristems
- secondary root
- secondary stem

<u>Plant Physiology (14 hours)</u>

water & nutrient uptake and transport

- water potential & osmosis
- long distance water transport
- transpiration and its control
- soil and mineral nutrition
- mineral uptake and transport
- organic material transport

metabolism

- photosynthesis
  - review of light reactions & carbon dioxide fixation
  - adaptations of the photosynthetic apparatus
    - C_3 and C_4 plants
    - CAM and SAM plants
    - light intensity adaptations
- respiration
- photorespiration

plant growth and development

development throughout the life of a plant (physiological life cycle)
germination
vegetative growth & plasticity
reproductive growth
flowering, pollination, seed formation, fruit formation
cell division, cell enlargement & differentiation
localization of growth
internal and external control of plant growth and development
control by growth substances
auxins
gibberellins
cytokinins
abscissins
ethylene
photomorphogenesis
phytochrome
red/far red controlled phenomena
leaf blade growth
plumular hook opening
seed germination
chloroplast orientation
flowering
tropisms
photo
gravi-
etc.

<u>Introduction to the Evolution of Plants (2 1/2 hours)</u>
review of Darwinian evolution
sources of variation
recombination
drift
mutation
hybridization
natural selection
adaptation
special evolutionary mechanisms of plants
hybridization - introgression
polyploidy
examples: marsh grass, *Asplenium* complex (fern)
evolution of cultivated plants
evolution of the plant life cycle
selective pressures in Angiosperms
adaptation to land
floral/reproductive strategies

- coevolution - pollinator/flower relationships
- wind pollination

the plant kingdom throughout time

systematics
- definition
- nomenclature - binomial system
- classification system

Kingdom Mycetae (Fungi including Lichens) (5 hours)

defining characteristics and features
- absorptive nutrition
- chitinous cell walls
- dimorphic forms: yeasts/hyphal
- reproductive variation
- dimorphism

ecological and economic roles of fungi
- saprophytism: decay
- parasitism: disease
- mutualism: mycorrhiza and lichens

Zygomycota
- coenocytic
- sporangium
- zygospore
- example genera: *Rhizopus, Phycomyces*

Ascomycota
- septate hyphae
- conidium
- limited dikaryon stage
- ascocarp with ascospores in asci
- unicellular forms
- multicellular/filamentous forms: *Peziza,* morels, *Claviceps,* truffles
- Lichens:
  - morphological forms: crustose, foliose, fructicose
  - linchen involvements

Basidiomycota
- septate mycelium with extensive dikaryon stage
- baidiocarp with basidia and basidiospores
- septate basidial forms: rusts, smuts, jelly fungi
- non-septate basidial forms: gill, pore and tooth fungi

Kingdom Protoctista: Plant-like Protists (5 hours)

geological background to the evolution photosynthetic protists
- algae defined
- distribution of algae

environmental parameters affecting algal growth and reproduction

brown algae (Phaeophyta)
- characteristics: cell wall, pigments, storage materials
- major morphological variants
  - microscopic filamentous - *Ectocarpus*
  - ribbon-like - *Laminaria*
  - highly-branched - *Fucus, Sargassum*

red algae (Rhodophyta)
- characteristics: cell wall, pigments, storage materials
- morphological considerations
- ecological considerations
- example genera including *Polysiphonia*

green algae (Chlorophyta)
- characteristics: cell wall, pigments, storage materials, motility and variations in nuclear division
- major morphological variants
  - unicellular motile - *Chlamydomonas*
  - colonial motile - *Volvox*
  - unicellular non-motile - *Chlorella*
  - multicellular, filamentous/sheet-like - *Ulva*
  - coenocytic - *Valonia*
  - stoneworts - *Chara, Nitella*

economic and ecological importance of algae
- primary production
- economic
  - cell wall products
  - food
  - fertilizers and soil conditioners
- role in eutrophication
- significance in reef building
- as scientific organisms

<u>Kingdom Plantae (17 1/2 hours)</u>

non-vascular plants

Bryophytes (2 1/2 hours)
- land plant format
- pigmentation
- multicellular sex organs
- "vascular-like" tissue
- habitat diversity
- true alternation of generations
- liverworts (Hepaticopsida)
  - thallous - *Marchantia*
  - "leafy" - *Riccia*
- hornworts (Anthocerotopsida)
- mosses (mucopsida)

- Bryidae - true mosses
- Sphagnidae - peat mosses

vascular plants
- sporophyte generation
  - predominant stage
  - leaf types
    - microphylls
    - megaphylls
  - spore production
    - sporophyll
    - sporangium
- gametophyte generation

lower vascular plants (2 1/2 hours)
- wisk ferns (Psilophyta)
  - characteristics
  - living genera: *Psilotum, Tmesipteris*
- club mosses (Lycophyta)
  - living genera: *Lycopodium, Selaginella, Isoetes*
  - fossil genera: *Lepidodendron, Sigillaria*
- horsetails (Sphenophyta)
  - living genus: *Equisetum*
  - fossil general: *Sphenophyllum, Calamites*

ferns (Pterophyta) (2 1/2 hours)
- Ophioglossales
- Filicales
  - homosporous ferns
    - sporophyte features
    - gametophyte features
  - heterosporous ferns

higher vascular plants -- seed-producing plants
- gymnosperms (2 1/2 hours)
  - origin of seed plants
  - Coniferophyta
    - features
    - life cycle
  - other gymnosperms
    - Cycadophyta
    - Ginkgophyta
    - Gnetophyta

flowering, seed-producing plants
- angiosperms (7 1/2 hours)
  - reproduction
    - flower structure
    - microgametophyte development
    - megagametophyte development

fruit and seed structure
origin and evolution of angiosperms
major groups of flowering plants
monocots
dicots

Plant Ecology (10 hours)
development of biomes of North America
deciduous forests of North America
characteristic species
environmental traits
ecology of Western Pennsylvania
mixed mesophytic forest
characteristic species
environmental traits
climate, soils & watersheds of Indiana County
physiographic provinces
the changing native flora
chestnut blight disease
Dutch elm disease
dogwood anthracnose
acid rain
introduced species
endangered plants

Humanistic Botany (2 1/2 hours)
agriculture
food
fibers
chemicals
impact of plant disease
plant biotechnology
medicinal plants
spice plants
poisonous plants
dye plants
hallucinogenic plants
wild edible plants

Tentative Class Schedule:
Week Topic (Each period represents 2 1/2 hours of class time)
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1 Period #1 - Introduction & Plant Propagation
Lecture/discussion of plant propagation.
Plant seeds, cuttings, spores, hydroponics, etc. for use later in course

Period #2 - Plant Cell Structure

Review of eukaryotic cell structure.
Lecture on cell wall composition and structure, plastids, and vacuoles.
Microscope work on plant cells: *Elodea* leaf and *Allium* epidermis; free hand sectioning and staining for starch, lignin, cellulose, pectin, vacuole.

2 Period #1 - Plant Cell Types

Lecture on the three cell types, functional specialization of each cell type. Free hand sectioning and observation of: parenchyma, schlerenchyma, collenchyma. Observation of prepared sections of same. Lecture on simple and complex tissues.

Period #2 - Plant Anatomy I

Lecture on internal and external anatomy of primary stem, leaf, and root and apical meristems. Observation of prepared slides of primary stem, root (cross & longisection) & leaves; Observation/dissection of fresh and preserved specimens of above.

3 Period #1 - Plant Anatomy II

Lecture on secondary tissues & adaptations.
Observation of prepared slides of secondary stem & root (woody & herbaceous). Observation of prepared slides of secondary stem and root. Demonstrations of leaf, stem & root adaptations for storage, water economy and reproduction. Observation of external anatomy and dissection of fresh and preserved specimens of above.

Period #2 - Plant Physiology I

Lecture on water potential, water uptake and transport of water and mineral nutrients in the xylem. Measurement of tissue water potential and cell osmotic potential; begin hydroponic mineral nutrition experiment.

4 Period #1 - Plant Physiology II

Lecture on mineral nutrition, uptake of mineral nutrients from soil; transport of photosynthate and storage materials in the phloem. Start transpiration measurement, effect of ABA on transpiration & unequal uptake of anions and cations.

Period #2 - Plant Physiology III

Lecture review of photosynthetic metabolism. Finish transpiration measurement, calculate area-specific transpiration rates; finish uneven uptake of anions and cations experiment. Computer simulation of transpiration and use of computer for data analysis and presentation.
Exam #1 (1 hour)
Special project description due.

5 Period #1 - Plant Physiology IV

Lecture on photosynthetic adaptations - C3/C4 & CAM/SAM plants, photorespiration and respiration. Photosynthesis experiment; start plant starvation. Computer simulation of photosynthesis; use of computer for data presentation and analysis.

Period #2 - Plant Physiology V

Lecture on physiological plant life cycle. Finish plant starvation and starch determination; start reversal of dwarfism by GA, gravitropism i whole plants, presentation time of gravitropic stimulus in watermelon radicles, phototropism in fast plants.

6 Period #1 - Plant Physiology VI

Lecture on plant growth substances, their effects and photomorphogenesis. Finish tropisms.

Period #2 - Plant Evolution & Systematics

Discussion/review of Darwinian evolution including sources of variation, natural selection and adaptation. Lecture on special evolutionary mechanisms of plants including examples, evolution of cultivated plants, evolution of the plant life cycle, adaptation to land and floral/reproductive strategies. Discussion of systematics.

7 Period #1 - Kingdom Hycetae (Fungi & Lichens)

Lecture on the polyphyletic nature of fungi and their role in environment; factors that affect growth and mating; living forms and the diversity of the non-fungal slime molds. Techniques for handling fungi; begin a series of fungal cultures; microscopic observation of basic and unique fungal structures.

Period #2 - Kingdom Myceteae (Fungi & Lichens) (cont'd)

Lecture on distinguishing major fungal groups by sexual reproduction: Zygomycetes, Ascomycetes, Basidiomycetes, and Deuteromycetes. Observation of prepared slides of major fungal groups; complete study of fungal cultures begun in period #1. Fungal associations: lichens, mycorrhizae, plant diseases and mycoses. Observation of histological slides of selected associations and infections. Observation and dissection of fresh and preserved materials of associations and infections.

8 Period #1 - Kingdom Protoctista (plant-like protists)

Introduction to algae: definition, evolution, distinguishing characteristics of the major groups. Green algae: structure, life cycles, occurrence and role in the environment. Microscopic study of Chlamydomonas, *Volvox, Chlorella, Ulva, Valonia, Spirogyra* and the stoneworts, *Chara* and *Nitella.*

Period #2 - Kingdom Protoctista (plant-like protists)

Red and brown algae: characteristics and life cycles. Study of *Fucus, Ectocarpus, Laminaria, Polysiphonia,* and *Porphyridium* through

microscopic sections and fresh and preserved specimens. Lecture and discussion of economic and ecological importance of algae.

9 Period #1 - Plant Kingdom: Bryophytes
Lecture on classification, morphology, and reproduction in the Hepaticopsida, Anthocerotocopsida and Mucopsida. Observation of prepared slides of representative taxa of greenhouse specimens and of living cultures of gametophyte development.
Period #2 - Plant Kingdom: Lower Vascular Plants except ferns
Lecture on development of megaphylla; fossil and extant genera of Psilophyta, Lycophyta, and Sphenophyta; variety of fossil ferns. Observation of aspects of morphology and reproduction from preserved and greenhouse specimens, prepared slides. Observation of fossils. Micro- and mega-gametophyte development in living *Isoetes*.
Exam #2 (1 hour)

10 Period #1 - Plant Kingdom: Ferns
Lecture/film presentation of variety and complexity of ferns, their growth and reproduction; fossil and extant forms. Propagation of ferns, induction and observation of fertilization in gametophytes. Fern anatomy and reproduction as observed with greenhouse specimens, preserved materials and prepared slides. Use of computers for fern taxonomy.
Period #2 - Plant Kingdom: Gymnosperms
Lecture on vascular plant modification for seed development, fossil and extant groups of gymnosperms: Coniferophyta, Ginkgophyta, Gnetophyta, and Cycadophyta. Study of the life cycle of the pine using fresh materials and prepared slides. Use of fresh and preserved materials to compare anatomy, morphology and major developmental stages of the four gymnosperm divisions.

11 Period #1 - Plant Kingdom: Angiosperms
Lecture on flower structure and megasporogenesis, floral adaptations for pollination. Dissection of various flowers, microscopic study of prepared sections showing megagametophyte development. Comparison of monocots and dicots. Lecture/demonstration of the major angiosperm families.
Period #2 - Plant Kingdom: Angiosperms (cont'd)
Lecture on microgametophyte development and pollution. Microscopic examination of prepared slides showing pollen development and development of embryonic plant; dissection of fruits and seeds. Continuation of lecture/demonstration of major angiosperm families.

12 Period #1 - Plant Ecology *:

Lecture on evolutionary development of the deciduous forest in the Eastern U.S. - topography, glaciation, climate and major plants; the deciduous forests of Western Pennsylvania.

Period #2 - Plant Ecology*

Interpretation of soils and topographic maps. Film on endangered plants of Pennsylvania. Group activity: use of SimEarth software for understanding competition/extinction/resource limits.

13 Period #1 - Plant Ecology*

Identification of important trees on IUP campus.

Period #2 - Plant Ecology*

Field trip to White's Woods; collection of soil samples.

14 Period #1 - Plant Ecology*

Discussion of forest structure and identification of the major plants of the canopy, sub-canopy, shrub and herb layers. Comparison of soil profiles from deciduous and coniferous forests

Period #2 - Humanistic Botany

Lecture/discussion of place of plants in human culture and evolution; different uses of plants and plant products; plant biotechnology and the future.

Final Exam

*Note: This subject matter and associated laboratory experiences will entail field trips. Thus, it will be taught early in the Fall Semester but late in the Spring Semester in order to be assured of weather conditions appropriate for learning.

IV. EVALUATION METHODS

The final grade for the course will be determined as follows:

75% Exams. 3 one-hour exams plus a comprehensive final (1 hour). The final exam will be formatted so as to include the third hourly exam plus the comprehensive final. All exams will be composed of a combination of objective, essay and lab practicum.

12.5% Special Project. Students will choose a group of no more than four students in the same section to cooperate in a project. Each project is intended to extend the students' knowledge of plant biology in an area of special interest. some examples of projects are: use of a computer simulation, construction of a demonstration, growth of a special group of plants, e.g. crop grains, *Equisetum,* planning and executing an experiment in plant anatomy or physiology.

During the first four weeks of the semester, students will be asked to choose their group-mates, decide on a project and present a one-paragraph description of the project. At the end of the semester a 5-page report (typewritten, double spaced, 1 inch margins) of the project will be presented to the instructor for evaluation. In addition,

each member of each group anonymously will give a % grade of each of the other group members on the basis of how much they helped on the project and the value of their help to the successful completion of the project. The grade for each project will be determined as follows: 50% instructor evaluation and 50% averaged peer evaluation.

12.5% Quizzes. Five unannounced, 10 point quizzes will be given during the semester. They will be composed of short answer questions. The purpose of these quizzes will be to impress upon the students the necessity of keeping up with the exposition of the course material, to determine student progress and to indicate trouble spots.

V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Textbook: Mauseth, J.D. Botany: An Introduction to Plant Biology. 1991, Saunders College Publishing, Philadelphia.

Course Manual: This manual will be written by the instructors and will include the course syllabus, lecture outlines, supplemental reading materials, directions and data sheets for the laboratory experiences and questions intended to direct study.

VI. SPECIAL RESOURCE REQUIREMENTS

Each student will be expected to supply the following items: a centimeter ruler, appropriately ruled graph paper, and a marker for writing on glass.

In order to teach Botany in the manner proposed, that is with an integrated lecture/discussion/laboratory, it will be necessary to revamp the current plant biology laboratory rooms (Weyandt Hall 214 and 215). It is realized that teaching in this manner puts all of the functions of lecture, discussion and laboratory in a single room; requiring some alteration. A lecture room will be freed up for three hours per week over the present Plant Biology (BI110). Further, since the emphasis of the course is changing from the present course to a more "hands on" and inquiry-style education it is necessary that the capability to grow some plant paterials be included in the two botany rooms.

The following renovations are required:
a. Room 215 must be modified to accommodate a plant growing area in which the students will grow plants for their own experiments and will conduct the experiments. The creation of such an area will entail the building of a rack of fluorescent lights, installation of an exhaust fan and an air conditioner, and the purchase of bins for storage of potting material. The estimated cost of this is appended (See Appendix #1) as part of a memo to the acting Dean.

b. Room 214 must be modified to accommodate 6 Macintosh computers for student use. Computers will be used by students for three separate purposes: review of class material using tutorial software, e.g. Omegaware Courseware; simulation as a learning aid, e.g. SimEarth and Plant Biology Data Sim; and analysis and presentation of data, e.g. Cricket Graph and Wormstat. Some further modification is required because some of the storage functions of room 215 will be given over to plant growth lights and because the formal lectures will be carried out in this room as well. The modifications are:

1. Modifications to the present lab tables so that microscopes may be stored in them. This has already been surveyed by a university carpenter and has twice been the subject of a work order.
2. The removal of microscope cabinets, relocation of a storage cabinet and a sink, installation of wall shelves for use with computers and the installation of hanging storage cabinets.
3. Addition of lecture functions in this room will require the purchase of an LCD panel, overhead projector and screen, as well as the replacement of the presently warped table top on the fron table.

Cost estimates for these alterations and purchases are included in the memo to the acting Dean (see Appendix #1).

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Annual Review of Plant Pathology
Botanical Review

November 2013 Senate Agenda

8 Department of Biology—Catalog Description Change

Current Catalog Description:

BIOL 210 Principles of Plant Biology **2c-3l-3cr**
Prerequisites: BIOL 201, 203
Explores the diversity, form, and function of vascular and nonvascular plants. Focuses on the evolutionary innovations that distinguish different taxonomic groups of plants. Topics include plant anatomy and physiology, growth and development, plant classification, plant ecology and genetically modified foods. Discusses ways that plants are important to humans, ranging from food and lumber to sequestering carbon dioxide. Provides an in-depth exploration of crop plants, including the science of biotechnology.

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Rationale: Last December when this course was revised the incorrect prerequisite number was listed in the proposal. The correct prerequisites should be BIOL 201 and 202 not 203.

From 11-4-14 Senate Minutes:

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