FIELD OF STUDY COURSE PROPOSAL
Approved by the Biology Department 28 March 2005

1. Proposed field of study: FSNB

2. Course number: Biology 100

3. Full course title: Biology of Plants

4. Catalog description: Holistic overview of plant biology, including elements of cell biology, biochemistry, biodiversity, morphology, growth, development, physiology and ecology, emphasizing direct interaction with live plants in the laboratory, field, and greenhouse integrated with understanding of cellular structures and processes and practice of the scientific method.

5. Prerequisites: none

6. Hours of credit: 4 (lecture + lab)

7. Estimated student enrollment: 20 (one section, lecture and lab) or 40 (one lecture, two lab sections)

8. By whom and when the course will be offered: W. J. Hayden; first offering in spring 2006

9. Staffing implications: this course will become part of Hayden’s regular teaching repertoire alternating with assignments in the biology core and upper-level electives

10. Adequacy of library, technology, and other resources: Library is adequate. Newly renovated labs and classrooms in Gottwald will adequately support class activities. Existing greenhouse facilities will support the course.

11. Relation to existing courses and curricula: proposed for FSNB status; the course may be found suitable for elective credit in the Environmental Studies major

12. Contact person: W. J. Hayden, X8232, jhayden@richmond.edu
Biology 100 - Biology of Plants

Purpose and rationale: Plants matter. Ecologically plants are autotrophic producers of organic matter at the base of most food chains, they function as important cogs in biogeochemical cycles, and they simultaneously create and define the habitats used by other organisms. In human economy they constitute much of the food we eat, the clothes we wear, the structures which provide our shelter, the objects that beautify our landscapes, and the raw materials for a myriad of industrial products. Further, the biology of plants is a curious mix of elements unique to the green world interwoven with common themes from the biology of microbes and animals. This course will provide an introduction to the scientific study of plants.

Re FSNB status: The nature of the scientific method will be discussed in lecture 1 (introduction). Presentation of material on cell membrane structure, the early branches of green plant phylogeny, and the function of certain plant hormones will illustrate the process of hypothesis formulation, hypothesis testing, and hypothesis revision in light of newly acquired data. Plant physiology laboratory experiments will require students to prepare a lab report in the format of a scientific paper.

Potential textbooks:


Topic Outline:

(Lab topics will be temporally correlated with lectures)

Introduction
Plant cells and molecules
  basic (descriptive) biochemistry
  plant cell structure and function
  cell respiration
  photosynthesis - biochemistry and environmental influences/adaptations (C4, CAM)
  mitosis
  meiosis (overview, general role in life cycles)
Plant diversity
  plant systematics and the study of diversity
  charophytes
  bryophytes
  pteridophytes
  gymnosperms
  angiosperms
  life cycle
  meiosis in anthers and ovules
  overview of angiosperm origins and evolution
Plant structure (with thematic emphasis on patterns of growth and environmental adaptations)
  early development (seeds, seedlings)
plant cells and tissues
root structure and function
shoot (stem/leaf) structure and function
secondary growth

Plant physiology
plant hormones
environmental influences on plant growth and development
plant nutrition, soils, nutrient cycles
transport of water and solutes; adaptations to environmental availability of water

Plant ecology
plant community ecology (nutrient cycling, trophic levels, succession)
global ecology (biomes)
plants and human ecology, agriculture: past, present and future