

*Continuation of ...*

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OFFICE OF DEAN  
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Course Proposal  
Life Science Department  
Submitted by Dr. Elizabeth Landecker

COURSE TITLE: Cellular Biology

CREDIT: 3 semester hours

PREREQUISITES: Biology I and II, Chemistry I and II

LEVEL: Sophomore, Junior or Senior

CURRENT CURRICULAR PATTERN: This would be a course of value for those earning a Liberal Arts Degree in Biology or in Biology Education.

UNIQUENESS OF COURSE: At the present, there is no course which deals in detail with the structure and function of the cell in the Life Science Department. A few of the topics included, such as mitosis or meiosis, are treated in a cursory and simplified manner in the introductory courses.

OBJECTIVES OF THE COURSE: The objectives of the course would be to acquaint the student with the molecular and structural features of life at the cellular level, and to give him practical laboratory experience which deals with a detailed study of the cell.

SCOPE OF THE COURSE: The course will deal with the micro- and macrostructure molecular components of the cell, cell structure, structure and function of the cell organelles, integration of the function of the cell, and radiation biology. A proposed outline of the course is attached.

TEACHING METHODS: Teaching methods will include lectures, discussions, and laboratory experiments.

EVALUATIONS: Evaluation of the student's progress will be made by lecture and laboratory examinations.

RATIONALE: The cell has a unique position in biology as a common denominator of life. No biology curriculum is complete without a course which delves extensively into the biology of the cell. Courses in Cell Biology (variously entitled "Cytology" or "Molecular Biology") are offered in the majority of the Biology Departments in the United States. In many Biology Departments, the entire curriculum has been given a cellular-molecular orientation, which is testimony to the great importance of this subject.

FACILITIES: A high-speed centrifuge, electrophoresis equipment, constant temperature chambers, and dark-field and fluorescent microscopes are available.

OUTLINE OF CELLULAR BIOLOGY COURSE:

- A. The cell concept
- B. The general morphology and organization of the cell
- C. The chemistry of the cellular components
  - 1. proteins
  - 2. nucleic acids
  - 3. lipids
  - 4. carbohydrates
  - 5. inorganic constituents
- D. The structure, function and chemistry of cytoplasmic organelles
  - 1. mitochondria
  - 2. plastids
  - 3. lysosomes
  - 4. endoplasmic reticulum
  - 5. microsomes
  - 6. cytoplasmic matrix
  - 7. golgi complex
  - 8. cell membrane
  - 9. vacuoles
- E. The structure, function and chemistry of the nucleus
  - 1. nuclear envelope
  - 2. nucleoplasm
  - 3. nucleolus
  - 4. chromocenter
  - 5. chromosomes
- F. Control of cell integration
  - 1. the genetic code
  - 2. nucleic acid synthesis
  - 3. protein synthesis
  - 4. genetic control of enzyme formation
- G. Mitosis and meiosis
  - 1. somatic mitosis
  - 2. meiosis
  - 3. endomitosis
  - 4. variations in mitosis
- H. Mechanics and physiology of cell division
  - 1. the mitotic and meiotic cycle
  - 2. spindle mechanism
  - 3. synapsis and chiasma formation
  - 4. energetics of cell division

- I. The chromosome coiling cycle
- J. Cytogenetics
  - 1. changes in chromosome number
  - 2. changes in chromosome structure
  - 3. cytology of sex determination
  - 4. cytogenetics and the fine structure of cells
- K. Radiation cytology
  - 1. effective radiations
  - 2. theories
  - 3. the effects of radiation
  - 4. physiological, mutational, chromosomal radiation effects
  - 5. radiation hazards
- L. Replication of genetic material in microorganisms
- M. Survey of cytological techniques
  - 1. fixation
  - 2. staining
  - 3. microscopy (dark-field and fluorescence)

BIBLIOGRAPHY FOR CELLULAR BIOLOGY COURSE:

- Barry, J. M. 1964. Molecular Biology: Genes and the Chemical Control of Living Cells. Prentice-Hall, Inc., Englewood Cliffs, N. J. 139 p.
- Carpenter, B. H. Molecular and Cell Biology. Dickenson Publishing Co., Belmont, California. 158 p.
- Goldstein, L. (ed.) 1966. Cell Biology. W. C. Brown, Dubuque, Iowa. 212 p.
- Haynes, R. H., and P. C. Hanawalt (eds.) 1968. The Molecular Basis of Life. W. H. Freeman, San Francisco. 368 p.
- Kennedy, D. (ed.) 1965. The Living Cell. W. H. Freeman, San Francisco. 296 p.
- Loewy, A. G. and P. Siekevitz. 1963. Cell Structure and Function. Holt, Rinehart and Winston. 228 p.
- McElroy, W. D. 1964. Cell Physiology and Biochemistry. Prentice-Hall, Inc. 120 p.
- Sager, R. and F. J. Ryan. 1961. Cell Heredity. John Wiley and Sons, Inc., New York. 417 p.
- Swanson, C. P. 1957. Cytology and Cytogenetics. Prentice-Hall, Inc., Englewood Cliffs, N. J. 596 p.
- Wilson, G. B. and J. H. Morrison. 1966. Cytology. Reinhold Publishing Corp., New York. 319 p.

#### 4. General Statement of Teaching Methods

Minimum Lectures -- Group work in class on problems. For assignments individual students will design systems on facts supplied by instructor. Class evaluation of such systems. Presentations by students in class on systems in use in business and government organization.

#### 5. Methods of Evaluation

Basically, multiple choice tests administered once weekly. Mid-semester and final examinations also partly on multiple choice questions, but also calling for essay type solutions to problems. Considerable use of college computer facilities to enable students to show they can use computer.

#### C. Rationale

Courses are necessary to complete the education of students in a broad sense. Nobody today should be ignorant of the part played by computer in everyday life, and a knowledge of how systems can be designed will be useful to correct tendency of computer to control all aspects of life. Many employment opportunities are available in the information processing field, but even those not employed in the field need to communicate with those who are.

#### IV. Statement from Department Chairman

There is an increasing demand for college graduates having a broad background in information processing as related to the fields of business and public administration. Employment opportunities in this field are growing substantially and present an excellent opportunity for Administrative Studies graduates. Mr. Owles having a broad background in the field of information processing has designed the courses for the in-depth specialization and will oversee the development and implementation of this portion of the Administrative Studies program. We expect that information processing will become one of the major fields of study within the Administrative Studies program.