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Submission Date: _____
Action-Date: App -11/23/04
Senate App - 4/26/05

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Dr. R. Hinrichsen Phone 357-2706

Department Biology

II. PROPOSAL TYPE (Check All Appropriate Lines)

_____ **COURSE** Biology of the Cell
Suggested 20 character title

_X_ New Course* BIOL 405 Biology of the Cell
Course Number and Full Title

_____ Course Revision _____
Course Number and Full Title

_____ Liberal Studies Approval+ for new or existing course _____
Course Number and Full Title

_____ Course Deletion _____
Course Number and Full Title

_____ Number and/or Title Change _____
Old Number and/or Full Old Title

_____
New Number and/or Full New Title

_____ Course or Catalog Description Change _____
Course Number and Full Title

RECD NOV 12 2004 LIBERAL STUDIES

_____ **PROGRAM:** _____ Major _____ Minor _____ Track

_____ New Program* _____
Program Name

_____ Program Revision* _____
Program Name

_____ Program Deletion* _____
Program Name

_____ Title Change _____
Old Program Name

_____
New Program Name

III. Approvals (signatures and date)

Anthe C. Hinrichsen 2-4-04
Department Curriculum Committee

Carl Lewis 2/4/04
Department Chair

02/08/04
College Curriculum Committee

John D Ed 2/13/04
College Dean

_____
+Director of Liberal Studies (where applicable)

_____
*Provost (where applicable)

1993 Gail S. Sechrist UWUCC Co-chair

Part II. Description of Curricular Change

I. Catalog Description

BIOL 405 Biology of the Cell

2 Class hours
3 Lab hours
3 Credits
(2c-3l-3cr)

Prerequisites: BIOL 111, CHEM 231, or permission of the instructor

Introduces students to the cellular and molecular mechanisms by which individual cells grow, receive and respond to internal and external signals, and move. The course will discuss the latest advances in the discipline and the students will be expected to utilize the current literature on their own as a means of building critical thinking skills. The student-centered laboratory portion of the course will emphasize individual and group activities.

II. Course Objectives

As a result of participation in this course, students will:

a. recognize and discuss the history of cell biology and judge its impact on society today

b. identify and assess the most recent concepts in cellular and molecular biology and generalize how they can be utilized to elucidate the basic principles of cellular behavior

c. demonstrate how the major advances in cellular and molecular biology have an impact on allied disciplines such as forensics, medicine, ecology, evolution and behavior

d. analyze and judge the literature in cellular and molecular biology

e. identify and perform modern laboratory techniques in cellular biology

f. use the group learning process as a means to perform, discuss and evaluate the scientific process in cellular biology

III. Detailed Course Outline

The topics for discussion in the lecture and laboratory segments of the course are listed in the order that they will be presented during the semester. This sequence is based on two lectures and one three-hour laboratory a week in an academic semester of 14 weeks. There will be 28 lecture sessions and 14 laboratory sessions. One laboratory will be utilized to analyze and discuss sets of problems that are relevant to the course. Two of the laboratory sessions will be utilized for the presentation of papers chosen from the literature that are relevant to the material covered in the laboratory. Undergraduate and graduate students will work together in both lecture and laboratory, but criteria for evaluation will be different. These differences are stated in detail in Section IV, Part A.

Topical Outline: BIOL 405 Biology of the Cell

A. LECTURE

Hour	Lecture Topic
1	Overview of the cell
2	Modern techniques to study cell biology
3-4	Chemistry of the cell
5	The structure and function of the nucleus
6	Molecular biology of the cell
7	Processing and transport of RNA
8	Protein translation in the cytoplasm
9	Protein processing and regulation
10	**EXAM #1**
11-12	Protein sorting and transport
13-14	Bioenergetics and metabolism
15-16	The cytoskeleton
17	Cell movement
18-19	The cell surface
20	**EXAM #2**

21-23	Cell Signaling
24-25	The cell cycle
26-27	Cancer
28	The cytoskeleton and Human Disease
29	**FINAL EXAM**

B. LABORATORY

Lab Session	**Topic of Laboratory**
1	Overview of *Chlamydomonas* and cell behavior
2	*Chlamydomonas*- phototaxis
3	Mating in *Chlamydomonas*
4	Motility in *Chlamydomonas*
5	Problem sets- group discussions
6	Effects of ions of *Paramecium* swimming
7	Exocytosis in *Paramecium*
8	Exocytosis in *Paramecium*
9	Endocytosis in yeast
10-12	Individual projects
13	Paper presentations
14	Paper presentations

IV. Evaluation Methods

The students will be evaluated using examinations, papers, research reports and classroom presentations. The students will be given three examinations for the lecture portion of the course- two during the semester and one final exam. A research paper will be written about a subject from the lecture material. The laboratory portion of the course

will require two detailed laboratory reports written in the form of a scientific paper and the presentation to the class of a paper from the current literature.

A. Types of Evaluation Used

1. Examinations

The examinations will consist of matching, short answer and essay questions. The essay questions will require the students to synthesize various aspects of the material that are covered in the lectures and textbook.

2. Laboratory reports

The students will be expected to write two formal laboratory reports that deal with a group of experiments completed in the lab. While the students will work in groups, the laboratory reports will be written individually. The reports will be in the form of a paper to be published in a scientific journal. The first report will cover experiments done during the first one-half of the semester. The second report will cover the independent research project that will be done towards the end of the semester.

3. Classroom Presentation of Current Literature

Each student will be assigned a specific paper that will be used for a presentation to the class. This paper will be from the current literature and involve some topic of the laboratory portion of the course. The student will be expected to summarize the paper, criticize the methods and conclusions and expand on its important points.

4. Research Paper

Each student will be expected to select a topic from the material covered in lecture and write a research paper on the subject. This paper must be between 10-12 pages in length with a literature cited section of at least 20 sources. The student is expected to take a subject from the lecture material and expand the breath of the subject, as well as critically evaluate the literature.

B. Grade Breakdown

1. Examinations (3 exams worth 15% each)	45%
2. Oral presentation	5%
3. Laboratory report (2 worth 15% each)	30%
4. Research paper	20%

C. Grading Scale

A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F = 0-59%

D. Attendance

The attendance policy will conform to the university wide attendance criteria.

V. Required Textbooks, Supplemental Books and Readings

A. Textbook:

The Cell: A Molecular Approach 3rd Edition by Geoffrey M. Cooper and Robert E. Hausman, 2004, ASM Press, Washington, D.C.
ISBN# 0-87893-214-3

B. Supplemental Readings (Optional):

Genes VIII by Benjamin Lewin, 2004, Oxford University Press, Inc., New York
ISBN # 0-13-145140-5 (Hbk)

Cellular and Molecular Biology- Concept and Experiments by Gerald Karp, 2002, John Wiley & Son, Inc., New York
ISBN # 0-471-38913-7

C. Useful Web Sites

www.nih.gov National institutes of Health
www.nsf.gov National Science Foundation
www.ncbi.nlm.nih.gov National Center for Biotechnology Information
www.ndbserver.rutgers.edu Nucleic Acid Database Project
www.biomedcentral.com BioMed Central
http://fullcoverage.yahoo.com/fc/Science/Biotechnology_and_Genetics Biotechnology and Genetics- Yahoo
www.nhgri.nih.gov/index.html National Human Genome Research Institute
www.ornl.gov/TechResources/Human_Genome/home.html Human Genome Project Page
www.jcb.org Journal of Cell Biology
www.cellbio.com Cell and Molecular Biology
www.acb.org/ American Society for Cell Biology
www.mblab.gla.ac.uk/~julian/Dict.html Dictionary of Cell Biology
HTTP://.vlib.org/jScience/Cell_Biology WWW Virtual Library: Cell Biology
www.cellsalive.com Cells Alive
www.cell-biology.com/ Cell-Biology.com: Cellular Biology

VI. Special Resource Requirements

The resources required for this course includes the textbook. There are no requirements for the laboratory except a laboratory notebook. The students are not expected to supply any other resources and there is no lab fee associated with this course.

VII. Bibliography

Books

Molecular Cell Biology- Fourth Edition by Harvey Lodish, Arnold Beck, Lawrence Zipursky, Paul Matsudaria, David Baltimore and James Darnell, 2000, W.H. Freeman and Company, New York

Molecular Biology of the Cell by Bruce Alberts, Dennis Bray, Julian Lewis, Martin Raff, Mike Roberts, Keith Roberts, 1994, Garland Publishing, New York.

Laboratory Investigations in Cell and Molecular Biology by Allyn Bregman, 2001, John Wiley and Sons, New York.

Cell Physiology Source Book: A Molecular Approach by Nicholas Sperelakis (Editor), 2001, Academic Press, New York.

From Genes to Cells by Stephan Bolsover, 1997, Jeremy Hyams, Steve Jones, Elizabeth Shephard and Hugh White, Wiley-Liss, New York.

Molecular Biology of the Cell- The Problems Book by John Wilson and Tim Hunt, 1994, Garland Publishing, Inc., New York.

Principles of Cell and Molecular Biology by Lewis Kleinsmith and Valerie Kish, 1995, Harper Collins College Publishers, New York.

Light Microscopy in Biology: A Practical Approach. By Lacey, A.J. (ed.), 1999, Oxford University Press, New York.

Origin of Eukaryotic Cells by Margulis, Lynn, 1970, Yale University Press. Boston.

Subcellular Fractionation: A Practical Approach by Graham, J. and D. Rickwood (ed.), 1999, Oxford University Press, New York.

Cells: A Laboratory Manual by Spector, D., R. Goldman and L. Leinwand, 1998, Cold Spring Harbor Laboratory Press, Plainview, NY.

Journal Review Articles

Current review articles from the literature will be made available for the students. These articles will allow the students to be introduced to the most recent findings in the field of cell biology. An example of several such review articles is given below.

Anderson, R. 1998. The caveolae membrane system. Annual Review of Biochemistry. 67: 199-225.

Farquhar, M. and G. Palade. 1998. The Golgi apparatus: 100 years of progress and controversy. Trends in Cell Biology. 8: 2-10.

Geeves, M. and K. Holmes. 1999. Structural mechanism of muscle contraction. Annual Review of Biochemistry. 68: 687-728.

Hynes, R. 1999. Cell adhesion: Old and new question. Trends in Cell Biology. 9: M33-M42.

Kirchhauen, T. 1999. Adaptors for clathrin-mediated traffic. Annual Review of Cellular and Developmental Biology. 15: 705-732.

Koehler, C., S. Merchant and G. Schatz. 1999. How membrane proteins travel across the mitochondrial intermembrane space. Trends in Biochemical Science 24: 428-432.

Smith, C. and B. Pearse. 1999. Clathrin: Anatomy of a coat protein. Trends in Cell Biology. 9: 335-338.

Talcott, B. and M. Moore. 1999. Getting across the nuclear pore complex. Trends in Cell Biology. 9: 312-318.

2. Course Analysis Questionnaire

Section A: Details of the Course

A1. The course is designed to be a 3-credit course that is intended for students who are either Biology and Biology Education majors, Biology minors or students in the Biochemistry program. This course lends itself to those students who are interested in fields of cellular and molecular biology and wish to expand their knowledge of the field beyond what is offered in the core Biology courses. It will not overlap with any Biology course that is being offered at this time. The course Cell Biology (BIOL 105) is for non-majors and will not overlap with this new course offering. The proposed course is designed to become a controlled elective in the planned Cell and Molecular Biology track that is currently being developed.

A2. This course does require that the current course offering- BIOL 350 Cell Physiology- be dropped from the Biology catalogue. The proposed course is intended to replace BIOL 350. No other changes to the Biology curriculum are required.

A3. BIOL 350- Cell Physiology- has been offered in the Department of Biology at Indiana University of Pennsylvania every other year for 12 years.
It was decided to write a new course proposal, change the name of the course and eliminate BIOL 350 from the catalogue, for several reasons. First, the name Cell Physiology is no longer an appropriate designation for the course. The field of cell physiology is presently a sub-discipline of cell biology. The title "Biology of the Cell" is more appropriate for the material to be presented in this course. Second, since this is intended to be a dual-level course, a change in the course number to the 400 level was deemed appropriate. Third, the new course proposal attempts to delineate both the undergraduate and graduate student requirements.

A4. This course is being designed as a dual-level course. The details of the graduate component of the course have been given in this new course proposal.

A5. This course will not be offered for variable credit.

A6. Most Biology Departments offer a Cell Biology course to undergraduate and graduate students. A few representative examples are listed below.

(1) BI 421- Cellular and Molecular Biology- West Chester University of Pennsylvania- an upper level course that cover eukaryotic cell structure and function. It deals with the molecular basis of life.
(2) BIOL 385- Cell Biology- Shippensburg University of Pennsylvania- an upper level course that deals with the structure and function of cells. It includes both lecture and laboratory.
(3) BIOL 3800- Molecular Cell Biology- Georgia State University- an upper level course that emphasizes processes and structure important to cellular function.

There is a laboratory (BIOL 3801) that teaches techniques and concepts of molecular cell biology.
(4) BIOL 203W- Biology: Molecules and Cells- Penn State University- a sophomore and junior level course that is a study of cellular phenomena including molecular genetics and metabolic interactions.

A7. No accrediting agency recommends or requires the skills or content of the proposed course.

Section B: Interdisciplinary Implications

B1. This course will be offered by a single instructor.

B2. There is no relationship between the content of this course and any existing courses offered by other departments.

B3. Seats in this course will be made available for students in the School of Continuing Education.

Section C: Implementation

C1. Five complement hours per offering will be required. Faculty resources are currently adequate.

C2. a. Space: One average size classroom per offering, to be used two times per week, will be required. Also, one laboratory with facilities for molecular and microscopic work is required. Current resources are adequate.
b. Equipment: Standard molecular biology equipment such as gel equipment for protein, video microscopy, and other standard Cell Biology equipment are required. Current resources are adequate.
c. Laboratory supplies: this will be covered by the Biology Department course budget. Current supply monies are adequate.
d. Library materials: Current holdings are not adequate for this course. Students will be required to use inter-library loan, faculty collections and Internet resources to supplement the library holdings.
e. Travel Funds: No travel funds are required.

C3. Not applicable. The course is not funded by a grant.

C4. It is expected that this course will be offered every other year, depending on demand.

C5. It is expected that one section of the course will be offered during the Spring semester.

C6. The course can accommodate up to 24 students. This is based on the maximum of one laboratory section at 24 students per section. This number will allow for student presentations to be offered in the time allotted.

C7. No professional society recommends enrollment limits for a course of this nature.