

PROCESS A NON-GENERAL EDUCATION ~ CURRICULUM PROPOSAL
LIBRARY RESOURCE FORM REQUIRED

SCC #03-04- 116

Deadlines

October 3, 2003 to be implemented Fall 2004 ~ February 13, 2004 to be implemented Spring 2005 *

PROPOSAL TITLE: Developmental Biology

Sponsor(s): Alison Krufka E-Mail: Krufka@Bowen Ext: 3402
E-Mail: _____ Ext: _____

DEPARTMENT: Biological Sciences

COLLEGE: Liberal Arts and Sciences

If Liberal Arts & Sciences CHECK : History/Humanities Math/Sciences Social/Behavioral Sciences
 UNDERGRADUATE GRADUATE

THE ATTACHED **NON-GEN-ED** PROPOSAL IS BEST DESCRIBED BY THE ITEM(S) CHECKED

- New non-gen-ed course
- Short-term non-gen-ed course
- Minor curricular changes (fewer than three) to:
 - Existing non-gen-ed course
 - Non-gen-ed degree requirements
 - Major
 - Minor, specialization, concentration, track, certificate program

THE FOLLOWING SIGNATURES REPRESENT APPROVAL

Department Chair: _____ Date: 5/11/04
Department Curriculum Chair: _____ Date: 5/11/04
Academic Dean: [Signature] Date: 5-13-04 *

COLLEGE CURRICULUM COMMITTEE

OPEN HEARING Date: 4/12/04 Approved Not Approved
COLLEGE CURRICULUM CHAIR: _____
Senate Curriculum Chair Signature: [Signature] Date: Senate Announcement 5-12-04
Comments: _____

EXECUTIVE VICE PRESIDENT/PROVOST Signature: [Signature] Date: 6/16/04

Approved Not Approved

Date: 6/28/04 REGISTRAR Course Description Received & Approved ~ Hegis Taxonomy & Course #: 0401428

Registrar Signature: [Signature]

NOTIFICATION FORWARD

- SCC Chair
- Academic Dean
- Department Chair
- Registrar
- IR
- CAP
- VP Student Affairs
- Others

Trans. 7-12-04

**Rowan University
Department of Biological Sciences
New Course Proposal**

Details

- a. Course Title:** Developmental Biology
- b. Sponsor:** Alison Krufka, Assistant Professor
Department of Biological Sciences
- c. Credit Hours:** 4 s.h.
- d. Course Level:** Undergraduate (400-level)
- e. Prerequisites:** Biology 1 (0401.100), Biology II (0401.101), and any one of the following Genetics (0422.335), Introduction to Biochemistry (0414.348), Introduction to Biochemistry-Lecture only (0414.440), Embryology of Animals (0427.401), Cell Biology (0401.430) or permission of instructor.
- 1f.** The proposed course will be offered on an annual basis.

*not enough room
for all
pre-reqs in
SIS system
SK 7/6/11*

Curricular Effects

Developmental Biology will be an elective for Biological Sciences majors and minors. This laboratory course will broaden the course offerings of the Department of Biological Sciences adding strength to Cellular and Molecular Biology curricular bank. This course will also provide an additional upper-level biology elective for Biochemistry majors in the Department of Chemistry and Biochemistry. There should be no other impact on departments of the College of Liberal Arts and Sciences or the University as a whole.

The sponsor, Dr. Alison Krufka was hired in 2003, in part, to develop this course. Dr. Krufka's Ph.D degree is in Developmental Biology and she has taught a similar course at the University of St. Thomas (Developmental Biology, Biology 465). Dr. Krufka is also a member of the Society for Developmental Biology. The facilities and resources of the Biological Sciences department are adequate for the proposed course and no cost of implementation is expected. Library resources are also adequate to meet the present needs of this course.

Rationale

A developmental biology course is noticeably absent from Rowan's course offerings as it is a standard course at most of Rowan's peer institutions. Developmental Biology is a historically significant yet rapidly advancing interdisciplinary area of research. Its inclusion in the curriculum of the Department of Biological Sciences is consistent with the goals of the Department, the College of Liberal Art and Sciences and the University. The proposed course will provide educational training in areas of emerging technologies, prepare Rowan students for jobs and graduate study, and expand contemporary course offerings. As Rowan University continues to develop as one of the premier institutions of New Jersey, it will be necessary to update course offerings to reflect the direction of scientific inquiry. Recent advances in developmental research including stem cell technologies, comparative genomics, mutant analysis and transgenesis, and animal cloning have made developmental biology a focal point of biological research. The awarding of the 1995 and the 2002 Nobel Prizes for Physiology or Medicine to two sets of developmental biologists further demonstrates the progress of this research discipline. Additionally, advances in developmental biology continue to contribute to innovation in biotechnology, pharmaceutical development, and medical research. Exposure to the interdisciplinary approach of developmental biology will prepare students to enter many professions including basic research, medical and other health professions, biotechnology research and other industrial careers.

Essence of the Course

a. Objectives of the Course: Developmental biology is a dynamic field that addresses the development of organisms from fertilization through embryonic and post-embryonic stages. The field of developmental biology has both a rich history and an exciting future. Current research uses the tools of cell biology, genetics, biochemistry and molecular biology to address the basic questions of how an organism is formed. By studying both classical and current research, students will explore the fundamental processes of embryology as well as the cellular and molecular signaling involved in complex developmental mechanisms. The course will include lecture, discussion, student presentation, and independent laboratory projects.

Student Outcome Objectives:

- Address developmental biology as an interdisciplinary subject and understand how embryology, evolution, genetics, molecular biology, biochemistry and cell biology contribute to our understanding of development.
- Understand the utility of multiple experimental systems used in the study of development.
- Develop skills for reading and understanding scientific papers in the current developmental biology literature.

- Develop confidence for the presentation and discussion of scientific literature and primary research.
- Increase competence in scientific writing skills.
- Strengthen understanding of the experimental approach in biology, by learning to independently address a specific question experimentally.

b. Topical Outline/Content

Lecture Content:

Introduction to the Study of Developmental Biology

Historical perspectives, Model systems, Experimental approaches

Getting it all started

Fertilization and cleavage, Localized determinates and polarity, Cellular differentiation

Techniques: Embryo manipulation, Microscopic observation, Transplantation

Cell Fate and Differentiation

Specification and determination, Gene regulation, Genomics, Cloning and stem cells

Techniques: Molecular approaches, Cloning, Stem cell technology

Patterning the Embryo

Embryonic axes, Induction, Germ layer formation, Molecular basis of “The Organizer”, Hox genes, Segmentation, the *Drosophila* body plan, Evolution of patterning

Techniques: Genetic Approaches, mutants, “knockouts” (transgenics and others)

Morphogenesis

Cell-cell adhesion, Cell migration, Gastrulation

Techniques: Biochemistry, Video microscopy, Antibody technology

Organ Formation

Limb patterning, Vulva induction, Heart formation, Nervous system development

Techniques: Laser ablation, Embryo manipulation, mutant analysis

The Germline

Sex determination, X-chromosome inactivation/dosage compensation, Primordial germ cells

Evolution and Development (“Evo-Devo”)

Conservation of developmental mechanisms, Pattern formation and body plan evolution, Molecular conservation

Techniques: Comparative genomics

Contemporary Issues

Student directed discussion of contemporary issues in developmental biology

Laboratory Content:

The laboratory portion of the course will be used to reinforce topical concepts and to expose students to experimental approaches to the study of development.

Various methods can be used to achieve these goals. In the laboratory a combination of the following techniques will be used at the discretion of the course instructor:

1. Semester-long independent research projects: Students will identify and propose a research project related to developmental biology. They will research, design and execute a laboratory investigation over the course of the semester.
2. Series of student-designed research projects: Like the semester-long research projects, students will research design, and execute laboratory investigations. However, a series of shorter investigations will be used.
3. Investigative laboratory exercises: Students will be guided through a series of laboratories designed by the course instructor to expose students to a particular experimental approach or laboratory skill.
4. Laboratory demonstrations: Students will explore various aspects of developmental biology through observation of living or fixed specimens.
5. Literature research: Students will explore experimental approaches through analysis of the primary and secondary literature.

c. Evaluation of Students and Grading

Students will be evaluated using various tools which may include written exams, written and oral analysis of primary literature, and class discussion. In addition, assessment of laboratory work may include evaluation of research proposals, research project implementation, laboratory reports, laboratory notebooks and oral presentations, at the discretion of the instructor.

d. Course Evaluation

The Biological Sciences Department evaluates all courses to ensure that they meet the requirements of the Department, the College of Liberal Arts and University.

Results of Consultations

- a. **Department Letters of Consultation:** Robert Newland, Chair, Department of Chemistry and Biochemistry
- b. **Individual Letters of Consultation:** Cathy Yang, Director, Biochemistry Program

Catalog Description

Developmental Biology

Prerequisites: 0401.100, 0401.101 and any one of the following 0422.335, 0414.348, 0414.440, 0427.401, 0401.430 or permission of instructor.

This course studies the development of multicellular organisms from fertilization, through embryonic and post-embryonic stages. Topics include fertilization, cellular differentiation, regulation of gene expression, pattern formation, morphogenesis, and evolution of developmental mechanisms. Experimental approaches of developmental biology will be emphasized.

Dear Dr. Krufka,

I have reviewed your course proposal for Developmental Biology and I support the proposal. The course content appears fundamental and will enhance the Biology program of those student who elect it. In addition, the course would be an useful elective for our Biochemistry majors as well.

Robert Newland, Ph.D.
Chair, Chemistry & Biochemistry
Rowan University
201 Mullica Hill Rd.
Glassboro, NJ 08028
(856) 256-4502
FAX (856) 256-4478
newland@rowan.edu

Dear Alison,

I have reviewed your course proposal for Developmental Biology, and I endorse this proposal. The course content is fundamental and will strongly enhance the Biology program. In addition, the course would be an interesting elective for Biochemistry students.

Please do not hesitate to contact me if I can be of any assistance.

Sincerely,

Cathy Yang

Cathy F. Yang, Ph.D.
Professor
Coordinator, Biochemistry Program
Department of Chemistry and Biochemistry
Rowan University
Glassboro, NJ 08028
(856) 256-5455(O)

Rowan University
Campbell Library
Library Resource Form

College: Liberal Arts & Sciences

Proposed by: Dr. Alison Krufka

Date: Feb. 11, 2004

Course Title: Developmental Biology (400-Level)

Anticipated Date for Course/Program Offering: Spring 2005

Part B: Resources that should be acquired

No specific additional resources are required.

Part C: Resources available in Campbell Library

The library has a core collection of monographs in Library of Congress headings for developmental biology, genetics, embryology, developmental neurobiology, cloning, and genomics. The library subscribes to a university press approval plan that provides approximately 2,100 titles yearly. A significant percentage of these include the natural and physical sciences.

Part D: List key periodical resources

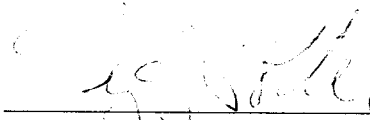
Campbell Library is fortunate to have access to online journal databases in a large number of disciplines, including the natural and physical sciences. Specific examples include:

Academic Search Premier (EBSCO)
Applied Science Fulltext
Biological & Agricultural Index Plus (Fulltext)
Elsevier (ScienceDirect)
General Science Fulltext.

In addition, paper subscriptions to 40 journals in the biological sciences are available (a number of these titles are also available online).

Part E: Librarian remarks

Given the book and online database resources, this course can be supported.



Gregory C. Potter
Associate Dean, Library

2/11/04