PROPOSAL SCC #00-01 703

CURRICULUM PROPOSAL FORM 2000-2001

NEW PROGRAMS, MAJOR PROGRAM REVISIONS, AND PROGRAM NAME CHANGES PROCESS C

*DEADLINES: Deadline dates for 2000/2001 submissions: Regular proposals: October 20, 2000 to be implemented in Fall 2001; Short-Term proposals: December 8, 2000 to be implemented in Fall, 2001; Regular proposals February 16, 2001 to be implemented in Spring, 2002; March 23, 2000 for short-term courses to be implemented in Spring 2002.

PROPOSAL TITLE: CURRICULAR "BANKING" FOR THE B.S. BIOLOGY MAJOR

SPONSOR(S): G. HECHT / J. SCOTT / P. MOSTO

DEPARTMENT: BIOLOGICAL SCIENCES

COLLEGE:

IF LAS CHECK ONE: ____History/Humanities __X__Math/Sciences ____Social/Behavioral Sciences

Check One: __X__ Undergraduate _____Graduate

The attached *NEW PROGRAM/MAJOR PROGRAM REVISION/PROGRAM NAME CHANGE* proposal is best described y the item(s) checked.

_____New degree program

_____New Certificate of Graduate Study Program

_____ New major

_____New minor

_____New concentration, specialization, or track

__X__Major changes to degree requirements, major, minor, or certificate program.

_____Changes to name of college, school, department or degree

_____Quasi Curricular

DEPARTMENT
(Signature indicates approval)

Dept. Curriculum Chair / Date

Dept. Chairperson / Date

ACADEMIC DEAN (& Graduate Dean, for New Graduate Programs Only)

Approved ✓ Not Approved _____ Comments:

Academic Dean's Signature/Date [signature] 1/7/02

Graduate Dean's Signature/Date _____

COLLEGE CURRICULUM COMMITTEE

Approved X Not Approved _____

Comments:

Numbering spelling error

Signature of College Chair/Date: [signature] 2/22/01

UNIVERSITY CURRICULUM COMMITTEE

Date of Open Hearing (if necessary) 3/16/01 Approved _____ Not Approved _____

Comments:

Minor change

Curriculum Chair Signature/Date [signature]

Date voted upon at Senate (if necessary) 5-8-01 Approved x Not Approved _____

EXECUTIVE VICE PRESIDENT/PROVOST

Approved _____ Not Approved _____ If no, reasons are as follows:

Student Credit Hours _____ Faculty Load Hours _____ Equalized Credit Hours _____

Official Copy & Approval Sheet Filed (Date): _____ Executive VP/Provost Signature/Date [signature]

REGISTRAR

Date Approved Course Description Received 5/22/01 Hegis Taxonomy & Course Number Assigned _____

Registrar Signature/Date Edwin C English [signature]

NOTIFICATION FORWARD

_____ Senate Curriculum Committee Chairperson _____ Academic Dean(s)

_____ Department Chairpersons _____ Registrar _____ Sponsor(s)

CURRICULAR "BANKING" FOR THE B.S. BIOLOGY MAJOR
Significant Changes to a Major/Degree Program
(considered more than 3 requirement changes)

1. ABSTRACT.

The title of this proposal is "Curricular 'Banking' for the B.S. Biology Major" and is sponsored by Drs. Hecht, Scott, and Mosto of the Biological Sciences Department. This proposal seeks to group most of the Department's upper-level courses into five curricular banks and to require Biology majors to complete at least one course from a minimum of four out of the five banks prior to graduation. The present degree requirements only recognize two banks (Botany and Zoology), and the Department feels that this arrangement does not reflect the current interdisciplinary nature of the field. This proposal does not seek to change the number of credits or the number of courses required for the B.S. Biology degree; thus, this proposal is not expected to alter the Department's resource requirements. The Department wishes to implement this proposal in Fall '01 for "native" students and Fall '03 for transfer students. Students enrolled prior to the implementation date will have the option to be either "grandfathered" (permitting them to fulfill their degrees under the current requirements) or to complete their degrees under the new system proposed here.

2. DETAILS

a. Title: Curricular "Banking" for the B.S. Biology Major

b. Sponsors: Gregory Hecht; Joanne Scott; Patricia Mosto (Dept. of Biological Sciences)

c. Scope and Size of Program. This proposal will restructure and add focus to the B.S. Biology degree requirements at Rowan University. The changes outlined are expected to affect Biology majors only. In Fall 1999, Rowan University's Institutional Research & Planning Office recognized 340 undergraduates who listed Biology as their major or coordinate major.

d. Need for Program. The interdisciplinary nature of the biological sciences has been increasing rapidly over the last several years. The biologists who will be most successful in the coming years will be those who have a broad understanding of the field and an appreciation for the various connections between the different biological disciplines. The changes described in this proposal will guarantee that our majors will be exposed to a wide range of biological subject areas prior to completing their degree.

In addition, the five banks described in this proposal are very similar to the five areas of Biology required by the State of New Jersey for high school teacher certification and to the topics covered in the Biology Subject Graduate Record Examination (GRE).

e. Requirements for Admission and Graduation. Currently, Biology majors must complete all University General Education requirements prior to graduation. Course requirements specific to the B.S. Biology degree include the following:

- complete Biology I & Biology II
- complete Chemistry I & Chemistry II
- complete Organic Chemistry I and Organic Chemistry II
- complete Physics I and Physics II
- complete Calculus I
- complete Calculus II OR Statistics I OR an additional advanced science course
- complete $\geq$30 semester hours of Biology courses (not counting Bio I & II). Of these 30 hours, a minimum of 24 hours must be in courses with a laboratory component; one of these courses must be from a "bank" of botany courses; one of these courses must be from a "bank" of zoology courses; and 2 of their hours must be from Special Topics (a/k/a Senior Seminar).

The Department proposes to group nearly all of its upper-level courses into a set of five "banks" and to require biology majors to complete at least one course from a minimum of four out of the

five banks to receive a B.S. Biology degree. The banks would encompass the following subject areas: (1) Anatomy/Physiology; (2) Botany; (3) Cellular/Molecular Biology; (4) Ecology/Environmental Science/Evolution; and (5) Zoology. The Department is not proposing to change the requirement of ≥ 30 semester hours in Biology courses, nor is it proposing to change any of the other B.S. Biology degree requirements. In essence, the Department is expanding its "banks" from two to five. The course list for each bank is presented in Section 4.c below.

f. Suggested Time of Implementation: The Department proposes that the requirements outlined in this proposal become effective for native students entering Rowan University during or after the Fall 2001 Semester and for transfer students entering Rowan University during or after the Fall 2003 Semester. The Department is ***not*** proposing that the changes outlined here be applied to native Rowan students who have enrolled prior to the Fall 2001 Semester or to transfer students who have enrolled prior to the Fall 2003 Semester. However, students enrolled prior to these dates will be given the option of completing their degrees under the changes proposed here.

g. Resource Requirements (library, space, and computing): The Department does not anticipate that implementation of this proposal will alter the Department's current needs in these areas.

h. Recommended Library Resources: The Department does not anticipate that implementation of this proposal will alter the Department's current needs in the area of library resources.

i. Staffing: The Department's need to hire new faculty will not be altered by implementation of this proposal. However, it is conceivable that the areas of expertise represented by future hires could change as a result of this proposal; such needs will be discussed with the Dean of the College of Liberal Arts & Sciences as they arise.

3. RATIONALE

The Department has stated in numerous official documents that it recognizes the increasing interdisciplinary nature of the biological sciences. The Department has repeatedly stated its commitment to providing a diverse curriculum with the intention of developing students' capacity for career flexibility and adaptability as well as satisfying students' intellectual interests beyond career preparation. This proposal is a natural consequence of this philosophy.

The University has a clear and obvious interest in maintaining degree requirements that reflect the needs of each area of study. This proposal ensures that the requirements for the B.S. Biology degree are relevant to that field.

4. ESSENCE OF THE PROGRAM

a. Major Goals of the Program. The Department has stated in numerous documents (e.g., its current Promotion Criteria and its Spring 1999 Assessment Report) that it recognizes the increasingly interdisciplinary nature of the biological sciences. Thus, the Department has stated that it wishes to maintain a diverse curriculum in order to provide students with the greatest opportunity to acquire a rich interdisciplinary understanding of the biological sciences. The Department has further stated that its students are expected to explore the diversity of its curriculum with the intention of developing their capacity for career flexibility and adaptability as well as satisfying their intellectual interests beyond career preparation.

b. Specific Objectives of the Program. The Department wishes to ensure that its majors receive a broad sampling of the various disciplines within the biological sciences. At the same time, however, the Department does not wish to prevent a student from specializing in a particular biological discipline as part of a focused, career-oriented path of study. With this in mind, the Biological Sciences Department is proposing that students complete at least one course from a minimum of four curricular banks (see below). Completion of the minimum "banking requirements" and of Special Topics (a course which is not included in a bank; see below) will generally entail 18 semester hours of course work. This still leaves 12 hours of biology course work that a student must complete in order to earn their degree. Moreover, the current requirements for the Concentrations and Specializations offered by the Department include courses from multiple banks. Thus, the Department believes that this proposal will provide students with the broad background that is required of today's biologists but does not

preclude the option of focusing extra time on coursework related to a particular biological sub-discipline.

c. Structure of Program:

i. Identification of Courses with Brief Description and Credit Hours for Each. This proposal does not create a new program, nor does it require the creation of new courses. This proposal categorizes nearly all of the Department's pre-existing upper-level courses into five "curricular banks." Because the descriptions of each of the affected courses (more than 40 in all) are available from the University's print and on-line catalogs, the sponsors have elected (after consultation with the University Senate Curriculum Committee Chair Dr. Martin Itzkowitz) not to list descriptions of each of its courses in this document.

The essence of this proposal is that nearly all of the Department's upper-level (*i.e.,* 200-level, 300-level, 400-level, and 500-level) courses be grouped into a set of five curricular "banks" and that as part of their coursework, students complete at least one course from a minimum of four banks. The composition of each of the five banks is shown on the following page.

Botany Bank

Introduction to Botany (0402.200)
Plant Diversity (0402.201)
Phycology (0401.300)
Plant Physiology (0406.580)
Plant Morphology (0404.579)
Pharmacognosy (0401.201)
Mycology (0401.325)
General Taxonomy ** (0401.420)

Zoology Bank

Comp. Vertebrate Anatomy * (0407.301)
Invertebrate Zoology (0407.200)
Parasitology (0401.356)
Ornithology (0401.352)
Herpetology (0401.454)
Mammalogy (0401.458)
Entomology (0421.401)
Ichthyology (0401.470)
Animal Ethology (0401.460)
General Embryology * (0427.401)
Embryology of Animals* (0427.597)
General Taxonomy ** (0401.420)

Anatomy/Physiology Bank

Human Anatomy & Physiology I (0410.210)
Human Anatomy & Physiology II (0410.212)
Human Physiology (0410.345)
Animal Physiology (0410.587)
Work Physiology (0410.350)
Comparative Vertebrate Anatomy* (0407.301)
Animal Histology* (0401.465)
General Embryology * (0427.401)
Embryology of Animals* (0427.597)

Cellular/Molecular Biology Bank

Animal Histology* (0401.465)
Introduction to Biochemistry (0414.440 or 0414.540)
Biochemistry I (0414.348 or 0414.548)
Cell Biology (0401.430)
Genetics (0422.335)
Molecular Genetics (0422.450)
Concepts in Human Genetics (0422.410)
Human Genetics (0422.598)
Cell Culture Technology (0401.435)
Microbiology (0411.330)
Immunology (0411.338)
Virology (0401.320)
Environmental Microbiology* (0411.405)

Ecology/Environmental Science/Evolution Bank

Environmental Science (0420.330)
Ecology (0420.310)
Physiological Ecology (0420.321)
Limnology (0418.400)
Marine Biology (0418.360)
Tidal Marsh Ecology (0420.474)
Environmental Toxicology (0420.425)
Environmental Microbiology* (0411.405)
Stream Ecology (0402.410)
Evolution (0401.310)
Systematics & Evolutionary Mechanisms (0401.407)
Conservation Biology (0401.405)
Pine Barrens Ecology (0420.595)
Evolutionary Theory (0401.500)

* Designates courses placed in more than one bank. Students may count a course towards fulfillment of only one bank; however, a student does not need to indicate which bank these courses fulfill until they apply for graduation.

** Faculty teaching General Taxonomy may elect to focus on the taxonomy of a particular group of plants or animals. For those instances in which the emphasis is on plants, the course will count towards fulfillment of the Botany Bank; for those instances in which the emphasis is on animals, the course will count towards fulfillment of the Zoology Bank.

Transfer credits for unusual courses (*e.g.*, a course on Protozoa) from various colleges will be applied towards specific banks on a course-by-course basis at the discretion of the student's advisor. Courses offered by New Jersey Marine Sciences Consortium will be also be handled in this fashion.

The following courses have not been placed into banks and will ***not*** count towards fulfillment of any of the bank requirements:

- *Human Biology (0401.110)*
- *Natural Resources (0420.100)*
- *General Biology: Human Focus (0401.113)*
- *General Biology: Environmental Focus (0401.112)*

  The Department feels that courses fulfilling a bank requirement should have a HEGIS number that is ≥ 200. None of the above four courses meet this requirement.
- *Essentials of Biology (0401.105)*
- *Principles of Ecology (0420.401)*

  The above two courses do not count towards fulfillment of the B.S. Biology degree (they are open only to Liberal Studies majors).
- *Independent Study (0401.450)*

  This is open to any biology major who wishes to do an independent study (generally library based) with a faculty member in the Department. It is not a bank or program requirement
- *Biology Lab/Field Research (0401.475)*

  This is open to any biology major who wishes to do field or laboratory research (up to 9 credits) with a faculty member in the Department or an approved internship program outside the Department. It is not a bank or program requirement.
- *Special Topics (0401.440)*

  Biology majors are already required to take this 2-semester-hour course prior to graduation and the Department feels that this requirement should stand apart from the described bank. Moreover, the topical content of this course varies dramatically each semester, making placement of this course into a particular bank pointless.

ii. Sequence of course work with description of major and general education requirements. Below is a model program for a "typical" Biology major under the current requirements:

MAJOR IN BIOLOGICAL SCIENCE BASIC MODEL
(Current Degree Requirements)

YEAR I				**YEAR II**			
College Comp. I	3	College Comp. II	3	Organic Chemistry I	4	Organic Chemistry II	4
Calculus I	4	Math/Science Elective	3	Botany Elective	4	Biology Elective	4
Biology I	4	Biology II	4	Zoology Elective	4	Physics II	4
Chemistry I	4	Chemistry II	4	Physics I	4	SBS Elective	3
Total:	**15**	*Total:*	**14**	*Total:*	**16**	*Total:*	**15**
YEAR III				**YEAR IV**			
Public Speaking	3	Biology Elective	4	Biology Elective	4	Biology Elective	4
Biology Elective	4	HHL Elective	4	Biology Elective	4	Free Elective	3
Art Elective	3	SBS Elective	3	HHL Elective	3	Free Elective	3
SBS Elective (M/G)	3	Advanced Science, Calculus II, or Statistics I	4	Gen. Ed. Elective (WI)	3	Free Elective	3
HHL Elective	3			Gen. Ed. Elective	3	Special Topics	2
Total:	**16**	*Total:*	**15**	*Total:*	**17**	*Total:*	**15**

The following is a model program for a "typical" Biology major under the changes proposed in this document:

MAJOR IN BIOLOGICAL SCIENCE BASIC MODEL
(Proposed Degree Requirements)

YEAR I				YEAR II			
College Comp. I	3	College Comp. II	3	Organic Chemistry I	4	Organic Chemistry II	4
Calculus I	4	Math/Science Elective	3	Biology Elective (fulfills Bank 1 of 4)	4	Biology Elective (fulfills Bank 3 of 4)	4
Biology I	4	Biology II	4	Biology Elective (fulfills Bank 2 of 4)	4	Physics II	4
Chemistry I	4	Chemistry II	4	Physics I	4	SBS Elective	3
Total:	**15**	*Total:*	**14**	*Total:*	**16**	*Total:*	**15**
YEAR III				**YEAR IV**			
Public Speaking	3	Biology Elective (any Bank)	4	Biology Elective (any Bank)	4	Biology Elective (any Bank)	4
Biology Elective (fulfills Bank 4 of 4)	4	HHL Elective	4	Biology Elective (any Bank)	4	Free Elective	3
Art Elective	3	SBS Elective	3	HHL Elective	3	Free Elective	3
SBS Elective (M/G)	3	Advanced Science, Calculus II, or Statistics I	4	Gen. Ed. Elective (WI)	3	Free Elective	3
HHL Elective	3			Gen. Ed. Elective	3	Special Topics	2
Total:	**16**	*Total:*	**15**	*Total:*	**17**	*Total:*	**15**

iii. Describe to what extent courses from other units in the institution will be used and include evidence of agreement from those units to provide such services. All of the courses listed in the banks are taught by the Department of Biological Sciences except for Biochemistry I (taught by the Department of Chemistry & Physics). Currently, students may count Biochemistry I towards their Biology major, and this long-standing arrangement is not altered by the changes outlined in this proposal. The Department of Biological Sciences does not anticipate that the changes described in this proposal will significantly affect enrollment in Biochemistry I.

d. Compare and contrast the program with similar programs of high quality.

Generally speaking, Biological Science programs tend to fall into three types (with some overlap). Some universities have a core program with the first four (4) courses mandatory for all biology majors and electives available only during the students' junior and senior years. Other universities offer separate bachelor's degree in Biology and Environmental Sciences. Those universities that offer one degree in Biology without a 2-year core of upper-level courses often require a distribution of courses in three (3) or more banks. The following are some examples taken from Universities comparable to Rowan:

Villanova – 3 banks (must do at least 1 course in all 3): Cellular and Subcellular Biology; Organismal Biology; and Ecology and Population Biology

Smith College – 6 banks (must do 1 course in at least 4 out of the 6 banks): A. Cell Biology; B. Genetics; C. Physiology; D. Organismal; E. Evolutionary; and F. Ecology

Wellesley College – 3 banks (must do at least 1 course in all 3): Cell Biology; Systems Biology; and Community Biology

Swarthmore College – 3 banks (must do at least 1 course in all 3): Cellular and Molecular Biology; Organismal Biology; and Population Biology.

Rowan University is therefore unusual in that it offers a single biology degree (B.S. Biology) but has minimal structure to its upper-level biology course requirements.

e. Administration: The changes proposed here are not expected to change administrative responsibilities or roles related to the Department of Biological Sciences or the B.S. Biology major.

f. Program Evaluation: The Biological Science Department routinely reviews the Department's courses and curriculum to assess their success in meeting the goals and objectives of the University, the College and the Program.

5. Results of Consultation

All consultation was internal to the Department of Biological Sciences.

6. New Courses.

No new courses are required to implement the changes proposed here.

5. Results of Consultation

All consultation was internal to the Department of Biological Sciences.

6. New Courses.

No new courses are required to implement the changes proposed here.