

TITLE Biology 3: Introduction to Cell Biology

Sponsor(s) Alison Krufka e-mail: krufka@rowan.edu  
e-mail:  
e-mail:

DEPARTMENT Biological Sciences  
College LAS

If LAS-check:  History/Humanities  Social/Behavioral Sciences

Math/Science

UNDERGRADUATE

New non gen-ed

Short-Term non gen-ed

Minor curricular changes (ft

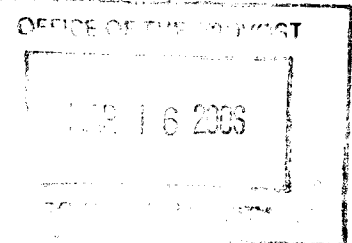
Existing non gen-ed course

Non gen-ed degree requirem.

Major

Minor, specialization, concentration, track, certificate program

*Krufka  
hecht  
denker*



*DB  
5/3/06*

**Signatures Required: representing approval before submission to Office of the Senate**

Department Chair: \_\_\_\_\_ Date: 10/17/05  
Department CURRICULUM Chair: \_\_\_\_\_ Date: 10/17/05  
Academic DEAN: \_\_\_\_\_ Date: 10-11-05

COLLEGE CURRICULUM COMMITTEE: Open Hearing Date: 10 26 2005  
Approved \_\_\_\_\_  
Not Approved \_\_\_\_\_

Signature: College Curriculum Chair [Signature]

Signature: SENATE CURRICULUM CHAIR \_\_\_\_\_  
Date: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_

Signature: Executive Vice President/Provost: \_\_\_\_\_  
Date: \_\_\_\_\_

Approved: \_\_\_\_\_  
Not Approved: \_\_\_\_\_

Signature: REGISTRAR [Signature]  
Date: 3/31/06

Course Description Received & Approved  
Hegis Taxonomy & Course

# BIOL 01.203

Notification Forward:

- SCC CHAIR
- IR
- CAP
- Registrar
- Academic Dean
- Department Chair
- VP/Student Affairs
- Other-

*Handwritten notes: 5-1-06, etc.*

This form **MUST BE COMPLETED FOR NEW COURSE or PROGRAM PROPOSALS, and EXTENSIVE CHANGES TO A COURSE or PROGRAM.**

The purpose of this form is to provide a channel of communication between the Campbell Librarians and faculty when submitting new course or program proposals, or making extensive changes to existing courses or programs. The information will be used to assess the resources available in the library, and to identify resources the library should acquire to support the new courses/programs, or extensive changes to same. The information will also provide the rationale for institutional support for library acquisitions. This form should be completed in a coordinated effort between the course sponsor(s) and the academic department liaison librarian.

**Note:** Sponsor(s) complete parts A & B  
If assistance is required to complete, please notify the librarian liaison.  
Forward this form to the librarian who will complete parts C, D & E

**When form is completed, attach to the original curriculum proposal before submitting to the Senate office.**

A. College: LAS Department: Biological Sciences

Proposed by: Alison Krufka Date: 10/7/2005

COURSE TITLE: Biology 3: Introduction to Cell Biology

Anticipated Date for Course/Program Offering: Fall 2006

**B. List specific resources that should be acquired to support this course.**

We anticipate that current library resources are sufficient for this course.

**C. Describe the resources available in the library to support this course/program, including reference, monographic, electronic databases, audio-visual materials, etc. A summary statement is sufficient.**

The library has 35 books under the subject heading Cytology. One highlight is the annual series "Advances in Cell Biology." Databases supporting this area include Science Direct, Medline, Nature, Annual Reviews, and Biological and Agricultural Index.

**D. List key periodicals available in the library to support this course/program.**

We recently began print and online subscriptions to *Cell* and to the 11 journals in the *Society of Microbiology* set at the request of Dr. Alison Krufka.

**E. Librarian comments & recommendations:**

We probably need to acquire a few new books in the area of cell biology, since our collection is rather small. Since Biology 3 will be first offered in the fall of 2007, we should have plenty of time to order and process a list of departmental requests in this area.

LIBRARIAN LIAISON: Denise Brush

Signature: Denise A. Brush

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

**Details**

- a. **Course Title:** Biology 3: Introduction to Cell Biology 0401-203
- b. **Sponsor:** Alison Krufka, Assistant Professor  
Department of Biological Sciences
- c. **Credit Hours:** 4 s.h.
- d. **Course Level:** Undergraduate (200-level)
- e. **Prerequisites:** Biology 1 and Biology 2 (Hegis Numbers Unknown)   
Biology 1: 0401-103, 0401-104
- f. **Implementation:** The proposed course would be offered for the first time fall semester 2007 and will be offered on an annual basis. All Biology majors will be required to enroll in this course.

**Curricular Effects**

Biology 3 is a new addition to the Biological Sciences Department offerings and will be required for all biology majors and minors. As the third of four courses in the proposed Biology core curriculum, students in Biology 3 will build upon the skills and knowledge developed in the previous two core courses. This laboratory course will emphasize cell biology and will partially replace content currently covered in Biology I. Other courses of the new Biology core will replace the remainder of Biology I, therefore, the current Biology I will be dropped as a course offering.

We anticipate that this course will be required for all 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 teach this and other Cell Biology courses. While Dr. Krufka's Ph.D degree is in Developmental Biology, her doctoral research was cell biology based. She has also taught upper-level Cell Biology in the Biological Sciences Department and has taught a similar introductory Cell Biology course at the University of St. Thomas (Cell and Molecular Biology, Biology 204). Dr. Krufka is also a member of American Society for Cell Biology. In addition to the sponsor of the course, the Biological Sciences Department has other members well-qualified to teach this course including Dr. Hecht, Dr. Iftode, Dr. Scott, and Dr. Tahamont.

The current resources of the Biological Sciences department are inadequate for the proposed course. The new core sequence will emphasize both knowledge content and skill development. Acquiring skills in current techniques in cell biology will be an integral part of the laboratory component of this course. To successfully integrate contemporary techniques in this course, we must modernize the equipment available to teach the laboratory. Without this equipment, our ability to offer the students the best educational experience and exposure to marketable skills will be compromised. The equipment required is listed in Appendix A. Library resources are adequate to meet the present needs of this course.

## **Rationale**

Biology 3 will be an integral part of the new biology core curriculum (please see Biology core curriculum proposal). As part of the core, the course will emphasize skill development, reinforcing skills developed in Biology 1 and 2 and introducing new ones. Like the other core courses Biology 3 will be an active learning environment that integrates investigative biology with contemporary course content. This course will provide a strong foundation in cell biology for all biology and biochemistry majors on which to build in various upper division courses.

## **Essence of the Course**

**a. Objectives of the Course:** This course will introduce students to the fundamentals of cell biology. Students will study areas of biological macromolecules, cell structure and evolution, membrane properties, enzymatic reactions, cellular respiration and photosynthesis, cell to cell signaling, signal transduction, cell cycle control, and regulation of gene expression. Course content will build upon the content learned in Biology 1, especially in terms of natural selection and evolution and Biology 2, especially in terms of molecular genetics. Specific skills developed in Biology 3 will include formal oral presentations and reading of primary scientific literature.

Student Outcome Objectives:

- Address the fundamental concepts of cell biology and understand how these relate to the general properties of all living organisms.
- Explore the experimental approaches used by cell biologists and strengthen understanding of the experimental biology by learning to design and interpret experiments.
- Develop skills for reading and understanding scientific papers in the current cell biology literature.
- Develop presentation skills.
- Increase competence in scientific writing skills.

## **b. Topical Outline/Content**

### **Lecture Content:**

#### **Introduction to the Study of Cell Biology**

Historical perspectives, Model systems, Experimental approaches

#### **Fundamentals of Life: The Cell as Life**

Evolution of Cells

Cell Diversity

Prokaryotes, eukaryotes, viruses

#### **The Building Blocks of Life: Cellular Organization and Structure**

Biochemical basis of cell biology

Macromolecules (Review)

Cell Organization: organelles and cytoskeleton

Cell Membrane and membrane transport

#### **Energy of Life: Making and Using Food**

Introduction to cellular metabolism and enzymes

Cellular energy

Photosynthesis

Cellular respiration

#### **Information of Life: DNA to Protein**

The Genome and inheritance (Review)

Transcription and translation (Review)

Regulation of gene expression

Protein processing and function

Cell diversity and tissues

#### **Cellular Reproduction**

DNA replication (Review)

Mitosis (Review)

Cell Cycle Control

#### **Cell to Cell Communication**

Cell-cell adhesion

The extracellular matrix

Cell to cell signaling

Intracellular signaling

Cell migration

#### **Cellular Basis of Disease**

Genetic basis of cellular diseases

Cancer (oncogenes, tumor suppressors)

### **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 cell biology. 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. 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 and/or laboratory skills.
2. After an initial exposure to a particular technique or experimental approach, students will design and execute their own experiments using the newly learned approach/technique.
3. Literature research: Students will explore experimental approaches through analysis of the primary and secondary literature and may use this literature to design and execute experiments.

### **c. Evaluation of Students and Grading**

Students will be evaluated using various tools which may include written exams, written and oral analysis of scientific literature, oral presentations, and class discussion. In addition, assessment of laboratory work may include evaluation of the following: laboratory notebooks, experimental designs, laboratory reports, and oral presentations.

### **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 Sciences, and the University. The assessment of these new core courses will be particularly rigorous and will follow procedures outlined in the proposal detailing the overall changes to the Biology major.

## **Results of Consultations**

The members of the Biological Sciences Department have been solicited for comments on the course proposal, and they have confirmed that this course would meet the standards of their department. A letter of consultation from the department chair is attached.

Consultation letters indicating support for this course are also attached from the Departments of:

- Chemistry and Biochemistry
- Physics and Astronomy
- Computer Science
- Psychology
- Chemical Engineering
- Mechanical Engineering
- Secondary Education

## Catalog Description

**Biology 3: Introduction to Cell Biology** ~~0701-203~~

Prerequisites: ~~0701-103~~ Biology 1 and ~~0701-107~~ Biology 2 (Hegis Numbers Unknown)

This laboratory course introduces students to the fundamentals of cell biology including the cellular basis of life, cell evolution, cellular organization, cell metabolism, cell diversity, cell-cell communication, intracellular signaling and the cellular basis of disease.

**Appendix A – Specialized equipment required to equip Biology 2 and 3 teaching laboratories**

<b>ITEM</b>	<b>Quantity</b>
Microbial incubators/shakers (liquid cultures)	1
Microbial incubators (plates)	2
Water baths	2
Nucleic acid electrophoresis apparatus	10
Protein electrophoresis apparatus	10
Electrophoresis power supplies	4
Microfuges (+ rotors)	4
Heat blocks	2
Rotators (Nutator)	2
Transfer apparatus	2
Microwaves	3
Pipettmen - set of 3 volume ranges	2
Mettler balance (>1 g range)	1
Mettler balance (< 1 g range)	1
Harvard trip balances	2
pH meters	4
PipetAid	4
microscope for cell cultures	1
rotor for cell culture centrifuge	1

To Whom It May Concern:

This email is intended to confirm not just my endorsement of the five new Biology Core courses and additional changes to the major, but also an endorsement from the Department as a whole. The entire Department has been consulted at every step in the development of these curricular proposals, and it has always met with unanimous support.

These changes will bring our Department to a level similar to comparable institutions. The emphasis in the new Core will be not just on knowledge content, but also on the skill content. We anticipate that the Core revisions will have a profound impact on the sophistication of our upper-level courses and on the marketable skills of our graduates. The commitment of our faculty to these changes is illustrated by their attendance at weekly core curriculum development meetings. The additional changes to our degree requirements directly address Department objectives and will enrich the qualifications and skill sets of our majors.

These new courses and the overall curricular changes have my strong, enthusiastic support, and I am happy to confirm that the Department is eager to implement them.

Sincerely,

Gregory B. Hecht, Ph.D.  
Interim Chairperson  
Associate Professor of Microbiology  
& Molecular Biology  
Department of Biological Sciences  
Rowan University  
201 Mullica Hill Road  
Glassboro, NJ 08028  
Office: Science Hall 130D  
Laboratory: Science Hall 221  
(856) 256-4834 (office, phone mail)  
(856) 256-4500 x3577 (phone mail only)  
x3024 (lab)  
Fax: (856) 256-4478  
hecht@rowan.edu  
<http://users.rowan.edu/~hecht>  
<http://www.rowan.edu/biology>



*Department of Physics and Astronomy*

**Date:** October 10, 2005  
**To:** Dr. Michael Grove  
**From:** Jeff Hettinger, Chair, Department of Physics  
and Astronomy  
**Re:** Curriculum Proposal

This memo provides the support of the Department of Physics and Astronomy for the reconfiguration of the introductory courses in the Biology program. We feel that this is an excellent idea/plan.

Students in our Physical Science program who are currently required to take either Biology I or II can be accommodated by your new Biology I course since it will remain in the Math/Science General Education Bank and the content description seems practical for this group.

These modifications may impact decisions our department makes in the future. Our department has been considering the possibility of enhancing our Physics program to include some Biophysics content in the form of a concentration or minor. Your response to Dr. Newland with regard to his Biochemistry program suggesting that it would be possible to take Biology II and III as well as upper level courses in Biology if the skills developed in Biology I and IV were accounted for in other courses ensures us that we can work out a solution to this issue when it arises.

The Department of Chemistry and Biochemistry fully supports the efforts of your department to reinvent your core courses. It is admirable that you engage in this level of effort to recreate the beginnings of your field and especially to include the broader concepts of science. We are very interested in your inclusion of active teaching methods and will watch this change carefully. We are also intrigued by the lab changes you propose that will result in the adoption of more inquiry based experiences.

We appreciate the many discussions we have had to fine tune the curriculum our biochemistry majors should follow under this new scheme.

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

Michael,

The Computer Science Department supports your proposed changes in the Biology sequence. Since our majors are required to take 3 semesters of lab science, and they often opt for Biology I and II, we are pleased to note the emphasis on Genetics and Evolution. This will help prepare our students for further study in Bio-informatics in graduate school.

Seth D. Bergmann	Interim Department Chair
Computer Science	<a href="mailto:bergmann@rowan.edu">bergmann@rowan.edu</a>
Rowan University	856-256-4500 ext. 3197
Glassboro, NJ 08028	Fax: 856-256-4741
USA	<a href="http://cs.rowan.edu/~bergmann">cs.rowan.edu/~bergmann</a>

To: Mike Grove, Biological Sciences  
From: Keiko Stoeckig, chairperson, Psychology Department  
Date: October 6, 2005  
RE: proposed changes to current Introductory Biology curriculum and Biology major

The Psychology Department has reviewed the proposed revisions to the Biology major and the Introductory Biology courses, and we would like to commend Mike Grove and the Biology Department for crafting such a thoughtful proposal. The overall revision to the Biology major, of course, is best evaluated by the Biology Department, and it will have little immediate effect for the Psychology Department. However, the restructuring of the Introductory Biology courses could have a substantial impact on the General Education courses required for Psychology majors.

Currently, Psychology majors are required to complete one of the following to fulfill the lab science General Education requirement: General Biology: Human Focus, Biology I, Biology II, or Anatomy & Physiology I. The Psychology Department has no objection to the restructuring of content as proposed for the new Biology 1 and Biology 2 courses, so long as these courses will be offered as General Education courses (as has been indicated in the course proposals). In fact, the content described in the proposed Biology 1 course appears to better fit the needs for a Psychology major than the content of the current Biology I course. (However, General Biology: Human Focus remains the course that best meets our needs, and thus will remain the recommended course for Psychology majors.)

There is some concern that the content of the proposed Biology 2 course might be too narrowly focused to satisfy the needs of our majors, so it might be the case that the Psychology Department would not permit Biology 2 to be used to fulfill the Biology lab science requirement. This could become problematic for transfer students, if the General Biology course taken at a community college were to be accepted as equivalent to the proposed Biology 2 course rather than the proposed Biology 1 course. However, in the event that this should happen, the Psychology Department might be willing to allow transfer student to complete another Biology course (such as Human Biology) to fulfill our Biology requirement. Nevertheless, attention to the transfer equivalence of the proposed Biology 1 and Biology 2 courses would be an important consideration for the Psychology Department.

Although, as stated earlier, the revision of the Biology major has little immediate impact on the Psychology Department, this revision might have a longer-term effect on the structure of a future neuroscience major (a joint program, in the early stages of development, to be proposed by the Psychology and Biology Departments). The increased flexibility afforded by the proposed changes to the Biology major would appear to allow for an easier integration of Biology courses into the neuroscience program, so from that standpoint, as well, the Psychology Department is supportive of the proposed revisions.

In summary, the Psychology Department offers its full support for this proposal. Although it is possible that, as a result of this revision, some initial minor difficulties might occur, the Psychology Department is certain that any such issues can be resolved. Thus, we believe that this well-conceived program proposal deserves the University's full support.

Thank you for the opportunity to review your program proposal. If you require additional information, please feel free to contact me at x4821 or [stoeckig@rowan.edu](mailto:stoeckig@rowan.edu).

A handwritten signature in black ink that reads "Keiko Stoeckig". The signature is written in a cursive style with a long, sweeping tail on the letter "y".



## Memorandum

### Mechanical Engineering

To: Dr. Michael Grove, Department of Biological Sciences

From: John Chen, Associate Professor and Chairperson

Date: 5 October 2005

A handwritten signature in black ink, appearing to read "John C. Chen".

Re: Letter of consultation for proposed revision of the introductory biology curriculum

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This letter is in support of the proposal entitled, "Revision of the Introductory Biology Curriculum and Biology Major," prepared and sponsored by the Department of Biological Sciences. My program supports the proposed revision and the new structure of the introductory biology sequence. These changes will not adversely affect Mechanical Engineering students.

Please contact me if there are further questions or concerns. Thank you.

Mike,

I have been reviewing the proposals for the biology core revision.

I'm impressed with the careful rethinking of your entire program that the department has undertaken. In COE we know a good deal about the work involved in a major restructuring of a curriculum! The active learning assignments and activities, the engagement with the professional literature, the deep holistic understanding of the field that you're striving for—these are elements that will strengthen student engagement with biology.

While our department curriculum committee hasn't had an opportunity to look at all the proposals in the detail they merit, I am venturing to suggest a couple of relatively small changes

1. The Course Evaluation section of the Biology 1 proposal needs more specific methods. Perhaps you should refer to the core curriculum proposal where these methods are described.
2. I note with approval that you're requiring Bio 1 students to use primary literature. However, you say that library resources are adequate. Are you sure about that? Will students have access to the databases and research articles they will need? I know that you're asking for a chunk of money to supply the laboratories needed for the new courses and you probably want to avoid asking for library resources in addition. However, you do need to have Greg Potter complete the library resources form for each of these course proposals and the core curriculum proposal. You're expected to at least list the resources available to you currently.

Initially, it appears that K-12 Subject Matter Teaching students will not be affected negatively by the change as the total number of credit hours will not change. The sequencing of the courses may need to be carefully worked out in future years for those students who are dual majors with K-12 Subject Matter-Biology. The special course to integrate transfer students is an excellent idea, and perhaps a model that other departments should emulate.

The inquiry-based methods you're proposing for your new curriculum might dovetail well with the Inquiry and Discovery course that elementary education majors are required to take in the new program. Just a thought!

After our SE/FE curriculum committee reviews your proposals, I will write a more formal letter. However, I believe that you can use this e-mail as evidence that you have consulted with us.

By the way, was your NSF CCLI proposal funded?

Holly Willett  
Chair  
SE/FE

The Chemical Engineering program has reviewed your curriculum proposal and we are supportive of the proposed changes to the Biological Science Curriculum.

=====

Robert P. Hesketh  
Professor and Chair  
Chemical Engineering  
Rowan University  
201 Mullica Hill Rd.  
Glassboro, NJ 08028-1701

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October 3, 2005

Dr. Michael Grove  
Department of Biology  
Dear Mike,

Thanks for sending me the copy of the biology department's proposed revision of its core curriculum and general education requirements. This looks like a well considered and quite exciting change, which promises to provide an even better biology training than the already very good one that Rowan's bio majors receive.

Our department has discussed your proposal to require Philosophy of Science of all your majors, and we are unanimous in supporting it. We deeply appreciate the interdisciplinary relationships our department has with so many others on campus, not least with the sciences, all of which will now require their students to take this course. We believe (as you obviously do) that taking the course will make your majors more thoughtful and theoretically alert scientists. The benefits are mutual; Matt Lund, who teaches the course, is excited about the prospect of having more scientists in his class, and when our major is finally approved and comes on line, our students will benefit by taking it with science majors.

There is no avoiding the fact that this requirement will have significant staffing implications for our department. You graduate between 70 and 80 majors each year, and that number is rising. Philosophy of Science, a writing intensive course, is capped at 25. That means we must add at least three new sections a year, more likely four, in order to meet the needs of your department. Chemistry and Biochemistry has just added Philosophy of Science to their requirements; and while Physics already requires it, they have begun allowing substitutions because the class is in such high demand. The unmet demand from these two majors will mean at least one additional section of the course.

So we must also ask for your support. Please join with your colleagues in the other sciences to tell the Dean and the Provost that the Biology department and the other sciences need two-thirds of a new line *in Philosophy and Religion* in order to implement your new core curriculum. We will ask for a full line for this purpose, and use the remaining third to reduce our dependence on adjuncts or to diversify our offerings in the philosophy of the sciences and technology.

Sincerely,

David Clowney  
Chair, Department of Philosophy and Religion



November 7, 2005

Dr. Michael Grove  
Biology Department  
Science Hall  
Rowan University  
Glassboro, NJ 08028

Dear Mike,

Thank you for the opportunity to review the proposed changes in the biology core curriculum and the five proposed courses required to implement the curriculum. I apologize for this very tardy letter of consultation.

The Secondary Education/Foundations of Education departmental curriculum committee has reviewed the proposals and supports them. We do not believe they will affect adversely our students, though we will need to be careful in scheduling our science methods courses. As we are consulting with the academic content major departments as we start scheduling our new courses, we do not view this as a difficult or onerous task. We are pleased to note the particular care you took to accommodate transfer students.

Personally, I think the proposals are a creative way of meeting changing perspectives in educating the next generation of biologists. My compliments to the committee.

Cordially,

Holly G. Willett  
Associate Professor  
Chair, SE/FE

Department of Secondary Education/  
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