

# Academic Program Review

## Self-Study for the Biology Department


2009

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- ❖ Biology Bachelor of Arts
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Although there were some changes in the courses offered in Biology during the 1990s, reflecting changes in the disciplines of Biology and the faculty expertise, there were no major program revisions in any of the Biology program curriculum until the following decade in which two major program revisions occurred.

In AY 00/01 the Biology B.A. and B.S. programs were substantially revised to reflect the incorporation of a more developmental student-centered approach. In this revision the basic Biology courses entitled “Life Diversity” and “Life Processes”, which were previously offered at the 200-level as the sole Biology prerequisites to all 300 and 400-level courses, were converted to 100-level science major specific courses and a sophomore core requirement was implemented that included Genetics, Ecology and Evolution, Physiology of Plants and Animals (or Human Anatomy and Physiology) and Cell Biology, with some required lab components. Only upon completing this sophomore core could Biology students proceed to take courses at the upper level from a menu of offerings representative of disciplines within Biology. This developmental approach was incorporated into both the B.A. and B.S. programs.

The B.S. program Biology core also incorporated a Biology Seminar intended as a capstone experience for students preparing to graduate. For both the B.A. and the B.S. there were some changes in the related science and math courses required. For example, for the B.A. program, Physical Geology could serve as a substitute for Physics, and in the B.S. program, Biochemistry (lab and lecture) became required. In this program the lab components associated with the upper level requirements were also rendered more specific to ensure students received sufficient preparation in experimental methods. In this version of the program the B.A. continued to require 36 Biology credits while the B.S. required 56 credits. At this same time the Biology Minor also implemented this developmental approach wherein students conducting a Minor in Biology had to complete the same freshman and sophomore core courses as those pursuing majors in Biology, but then only took 8 credits at the upper level. (In the earlier version of the program students completed 11 credits of sophomore core courses, one 300 level Evolution course and 13 additional credits at the upper level).

In AY 07/08 the Biology B.A. and B.S. programs were again substantially revised. At this time the College underwent a College-wide transition from a 3-credit to a 4-credit model. The Biology Department embraced this transition and used this opportunity to institute an integrated lab and lecture model into its programs. Almost all Biology courses include lab components and are now taught in lab classrooms where faculty and students can move between theoretical lecture-based learning to hands-on laboratory based learning. Some changes in the core courses also occurred. The first year course “Life Diversity” was remodeled into a course entitled “Evolution” to increase the focus on learning all Biology within the context of evolution as is appropriate for all modern Biology programs. The first year course “Life Processes” was altered to become “Cells and Molecules”. The sophomore courses were reduced to three: Genetics, Cells and Physiology and Ecology, each with an integrated lab component. Some changes in the upper level courses were also implemented where various types of Biology courses were organized into four categories (Molecular/Physiology, Plant/Microbiology, Animal Diversity and Ecology/Evolution) and students were required to take courses from each category, ensuring that students take a diverse array of courses representative of many disciplines within Biology before graduation. These changes were applied to both the B.A. and the B.S. program. As in the previous version of the program, all students are required to take an upper level Biology Seminar intended as a capstone experience for graduating students. Changes in the related science and math courses included the removal of the Calculus and Biochemistry requirement from the B.S. program. The number of Biology credits remained the same as in the AY 00/01 program for both the B.A. and B.S.

Despite the significant College-wide and Biology-specific changes that have occurred in the past several years, the Biology Program has continued its tradition of pedagogical excellence, expanded its commitment to integrating laboratory work into all science classes including some offered for non-majors, and increased the number of opportunities for students to conduct undergraduate research in Biology. We have also maintained our strong commitment to General Education through service to the new College Integrated Studies Program, discussed in Section 6.

#### *STUDENTS SERVED*

The Biology Programs serve students who major in Biology, Chemistry, Environmental Studies, Health Sciences, Education and General Science, as well as fulfilling an important role in providing courses for the Integrative Studies Program required of all KSC students. The specific courses and their enrollment patterns are discussed in Sections 7 and 8. At the time of the last Program review (1999) all of these majors were in existence and Biology was already providing courses to support each of these types of majors. Changes in the past 10 years in *how* Biology serves students are due primarily to the recent increase in the numbers of students served and the implementation of both a new Biology Program and a new Integrative Studies Program. Enrollment at KSC has increased from 3995 Full Time Equivalent (FTE) students (Fall 1999) to 4979.8 FTE (Fall 2008). This increased enrollment has resulted in a greater demand on all programs including Biology. The number of majors in Biology has grown from 14 (BA) and 26 (BS) in 1999 to 16 (BA) and 56 (BS) in 2009 (Table 8.1). The increased number of students has resulted in a requirement for more sections of non-majors courses and courses offered for other Programs (see sections 6 and 7 of this report). Furthermore, the implementation of the new Biology Program and the new ISP Program have resulted in a significant redesign of courses.

#### *FACULTY*

At the time of the last program review (1999) the Biology Department consisted of 6.5 full time tenure track faculty, with one member of the Department assigned ½ time to Biology and the other ½ time to Environmental Studies (Dr. Renate Gebauer). Since that time five Biology faculty were hired (Zhjera, Zerucha, Porter-Utley, Launen and Kolodziejski) and 4.5 have departed due to retirement, resignation, death, and reassignment (Wise, Zhjera, Zerucha, Kolodziejski and Gebauer). Currently the Biology Department possesses 7 full time tenure track faculty. Section 12 describes this faculty turnover in more detail. In addition, the Biology Department employs one contract lecturer (Jarry) and one Professional and Administrative position (Smith), several adjuncts including one full-time adjunct (Piscopo) and two part time laboratory and greenhouse technical support staff (Featherston and Beltz). Turnover in these laboratory preparatory positions is also discussed in Section 12.

#### *NOTEWORTHY CHANGES*

The Biology department relocated from the first Keene State College Science Center (the “Science and Arts Building”) constructed in 1967 to the current, state of the art Science Center in 2004. The Science Center is equipped with 32 labs for teaching and research, all designed with Science faculty input, and houses millions of dollars worth of high-tech equipment including a DNA sequencer, DNA microarray equipment, gas chromatograph-mass spectrometer and fluorescence microscope, to name a few key pieces. In 2008 the College supported the Biology Department’s internal grant application (the Strategic Initiatives process) and awarded us \$1.8 million to purchase new microscopes, dissecting scopes and accompanying imaging technology. Very few



other undergraduate colleges in the region, or the nation, offer the research and study opportunities now available to Keene State College students in Biology (or the other natural sciences).

In addition to implementing the novel integrated lab/lecture model in our curriculum, the improved physical space and research equipment has resulted in an increased level of research occurring within the Biology Department. This has created opportunities for more students to participate in undergraduate research opportunities and facilitated obtaining grants. The Biology program is committed to the integration of research with teaching by offering undergraduate research experiences to deserving majors. The expansion in the amount and scope of research conducted with students in the Biology program has led to increased participation of Biology students in local, national and international conferences where KSC Biology students are presenting their own undergraduate research. For example, in the AY 2008/2009 alone 8 KSC Biology students presented at the Northeast Undergraduate Research Conference in Maine, and four have attended international conferences in Biology disciplines to present their research. This has resulted in greater recognition for the Biology program at KSC regionally and nationally and expanded opportunities for students including expanded and immediately marketable job skills and improved candidacy for graduate programs. We expect this trend to continue growing as more research programs become better established in the Biology Department as we are now more competitive in our applications for research funding to support student endeavors. The downside of what should be seen as a welcome development, is that faculty workloads have increased to almost unsustainable levels because research experiences with undergraduates is not well-supported and completely uncompensated (see section 16).

## **SECTION 2: RESULTS OF LAST PROGRAM REVIEW**

The previous program reviews, by the Vice President for Academic Affairs (Robert Golden) and the Senate Academic Overview Committee, were conducted from August 1999 to April 2000. These reviews are mentioned in the VPAA's executive summary of that Program Review in the appendices of this self-study. Two external reviewers from the University of Maine at Farmington and Colby College contributed to the reports.

In the previous reviews, the strengths of the Biology program were identified as the faculty, which were described as well-qualified, devoted to teaching, and collegial, and the curriculum, which was described as developmental in design and focused on student-learning. The primary weaknesses of the program were identified as the severe inadequacies of the facilities, equipment, and supply budgets; the heavy work expectations for the faculty; and the overall lack of support for traditional forms of scientific scholarship. It is important to note that virtually all of the weaknesses identified in those reports could be defined as lack of institutional support for the program and its faculty and that few, if any, of the issues could be remedied by the faculty alone.

Ten years later, Biology faculty remain collegial and committed to working collaboratively and creatively to improve our curriculum and to contribute significantly to the Integrative Studies Program and to the liberal arts mission of the College. While we are currently understaffed due to the death of a young, new faculty member and the loss of a half-time position to the new Environmental Studies Program, we anticipate that we will continue to identify and hire excellent faculty that are a good fit for our mission.

Since the last program review, many, but not all, of the weaknesses listed above have been addressed. The Biology Department is now in the new Science Center and has well-designed classrooms and teaching laboratory spaces to support its new four-credit curriculum. The Department also has three shared research

spaces to support faculty and undergraduate research efforts. We have purchased new equipment for teaching and research with College funds and with grants from the National Science Foundation. The recent hire of Penny Micele to direct the Office of Sponsored Research has greatly facilitated grant-writing efforts at KSC. The Department was awarded a Strategic Initiative Grant in 2008 which allowed for the replacement and expansion of our entire microscope inventory. Our supply budget to support our courses has increased and, while still inadequate for some of our courses, has increased significantly since the last review.

However, there are some very important challenges that remain unsolved. Faculty workload is even heavier than ever as faculty attempt to write grants, develop their research projects and spaces to their full potential, and contribute to the ever expanding service work required by the College. The previous report stated that the outside reviewers were very concerned that “the strong synergy between research and teaching is not facilitated very well by KSC administrative support.” While we now have some of the facilities we need to support research with undergraduates, the lack of time, financial support, and ongoing technical support makes it difficult to sustain a viable research effort. Although providing research experiences for our majors is likely one of the most critical learning experiences we offer, we have yet to find a way to do this work and receive any form of compensation (time or money). While the College receives tuition for independent study credits, research with undergraduates remains an uncompensated, complete add-on to our current demanding teaching loads. In addition, there is no incentive for faculty who are fully promoted to continue their research efforts.

### SECTION 3: PROGRAM GOALS

As stated in the Keene State College catalog, the programmatic goals for Biology are as follows:

***1) Biology majors will be able to demonstrate understanding in the following fundamental areas of the biological sciences:***

***Biological Diversity:*** Biological diversity is the diversity of subspecies, species, and higher level taxa or clades, the phylogenetic relationships of those taxa, and the features that distinguish specific lineages or taxa. This concept does not include genetic or phenotypic diversity of individuals within a species.

***Evolution:*** Evolution consists of change in the hereditary characteristics of groups of organisms over the course of generations. It encompasses several subdisciplines: behavioral evolution, evolutionary developmental biology, evolutionary ecology, evolutionary genetics, evolutionary systematics, paleontology, and molecular evolution.

***Sub-organismal Biology:*** Sub-organismal refers to the structure, function, and evolution of the components of individual organisms, from the molecular level to tissue and /or organ-system level. This includes, but is not limited to, biochemistry and metabolism, proteomics, genetics, molecular and cell biology, neurobiology, and physiology.

***Organismal Biology:*** The term organismal refers to individual organisms and their structures and processes, such as reproduction, development, life cycle events, ecophysiology, behavior, feeding, locomotion, dispersal, and mortality. Whether applied to single-celled microorganisms or to complex multicellular organisms, 'organismal' denotes specific modes of survival and reproduction and refers to the target or object of natural selection.

***Supra-Organismal Biology:*** Supra-organismal refers to populations, communities, ecosystems and other higher levels of biological organization such as landscape, biome or biosphere. It includes focus on patterns of diversity, community succession, species interactions, behavioral ecology, population dynamics, trophic structure, nutrient cycling, and energy flow.

- 2) ***Biology majors will be able to develop testable hypotheses, design experiments to test hypotheses, and conduct experiments including data collection, analysis, interpretation and presentation. They will also be able to effectively search computer databases for relevant literature (primary and secondary) on scientific topics.***
- 3) ***Biology majors will demonstrate critical thinking and communication skills, both oral and written, for the purposes of conveying biological information to professional scientists and the lay public.***
- 4) ***Biology majors will develop intellectual independence, scientific literacy, and an appreciation for the connections between biological science and society.***

Upon graduation, the majority of our majors enter the workforce. Many will later apply to graduate programs after working in biotechnical or pharmaceutical fields or in natural resource research or management fields for typically one to five years. A significant number of students enter graduate programs in the biological sciences or professional programs (e.g. medicine and pharmacy) immediately upon graduation. The Biology Department offers three programs: the B.S. in Biology, the B.A. in Biology and the Biology minor (see Design of Programs) to meet the diverse needs of our majors. Students preparing for technical employment or post baccalaureate study in graduate school, or professions such as medicine, dentistry, veterinary medicine, teaching, and natural resource management are encouraged, in most cases, to pursue the B.S. in Biology. However, some of our students are advised to pursue the B.A. in Biology so they can leave room in their schedule to also obtain a B.A. or minor in Chemistry or another major or to meet special course requirements for certain post-graduate programs (e.g. Pharmacy) that do not count toward their Biology major (e.g. Human Anatomy and Physiology, Kinesiology, Psychology, etc.). Those that take the B.A. are often encouraged to complete a “B.A. Plus” where they take additional courses commonly required by graduate or professional programs like Organic Chemistry and a full year of Physics. The Biology minor is designed to permit students majoring in another field to pursue a program of study in the life sciences.

The Biology Department constantly assesses its programmatic objectives to ensure they meet workforce needs, as many of our students work in the biotechnology industries, and post-graduate program requirements (medical, dental, and pharmacy programs and M.S. and PhD programs in many areas). We also work closely with the Secondary Education program (specifically Dr. Sally Jean) to ensure we are meeting the course requirements of students who intend to obtain certification to teach high school-level biology. Biology is very interdisciplinary in nature with many sub-disciplines; therefore, there is no single professional organization to consult regarding our programmatic offerings.

## SECTION 4: RELATION OF THE PROGRAM TO THE MISSION OF THE COLLEGE

### *COLLEGE MISSION & VALUES*

Keene State College prepares promising students to think critically and creatively, to engage in active citizenship, and to pursue meaningful work. As the public liberal arts college of New Hampshire, we offer an enriching campus community and achieve academic excellence through the integration of teaching, learning, scholarship, and service.

Our liberal arts mission dedicates us to the development of knowledge and skills necessary to meet the challenges of our changing world. As a public institution, we provide educational opportunities for all qualified students and continue our heritage of service to New Hampshire and the New England region.

We value:

- all members of our community: students, faculty, staff, alumni, and friends.
- strong relationships among students, faculty, and staff.
- excellence in teaching, learning, and scholarship.
- commitment to learning and cultural enrichment.
- social justice and equity in our community and in our curriculum.
- educational challenge and support for a wide range of learners.
- physical and financial access and support.
- balanced development of mind, body, and character.
- diversity, civility, and respect.
- civic engagement and service to the community.
- environmental stewardship and sustainability.
- partnerships that enhance the quality of life in the Monadnock region, New Hampshire, and the world.
- an attractive campus that inspires and supports inquiry, reflection, and social interaction.

### *MISSION OF THE BIOLOGY DEPARTMENT*

Our goal is to foster an understanding of biology not as a compilation of unchanging facts but as a way of thinking, always subject to revision based on new insights and observations. Our programs teach students the scientific method, a mode of inquiry involving rational observation, experimentation and critical analysis. Through our programs students will develop an understanding of all forms of life, their evolutionary histories and relationships, and their interactions at levels of integration ranging from molecular to biospheric. We prepare students for graduate programs in biology and for a broad range of biology-related careers including those in the fields of biotechnology, environment, medicine and teaching. Our department supports the Keene State College liberal arts mission through the cultivation of an appreciation of natural science and its relevance in society for all Keene State College students including non-Biology majors.

## *THE BIOLOGY DEPARTMENT'S MISSION AS CAPTURED IN THE DESCRIPTIONS OF ITS PROGRAMS:*

The Bachelor of Science program in Biology is designed to stimulate intellectual and personal growth through an examination of the fundamental properties of living systems, the application of experimental and descriptive methods of discovery, and the consideration of the social, ethical, and aesthetic aspects of biological knowledge. The B.S. program also provides undergraduate preparation for technical employment or post baccalaureate study in graduate school, or professions such as medicine, dentistry, veterinary medicine, teaching, and natural resource management. A Biology major considering graduate or professional school should confer with a Biology advisor to plan a program to meet the student's specific needs and assure entrance into such a school.

The Bachelor of Arts in Biology provides an introduction to the discipline and an opportunity to integrate the study of Biology with another field. In contrast to the B.S. program, the B.A. requires fewer credits in both biology and related sciences, permitting a student to complete a second major or additional courses in another discipline such as Chemistry, Psychology, Elementary Education, Journalism, Art, Management, or Computer Science; thus, it satisfies the needs of students with a combination of interests.

The minor program in Biology is designed to permit students majoring in another field to pursue a program of study in the life sciences, this minor includes a set of core courses that introduce the most important concepts in biology as well as upper-level electives dictated by the personal interests of the student.

### **SUMMARY**

The Biology Department's program goals support the College's mission and values. We "prepare promising students to think critically and creatively" by integrating a challenging variety of problem-solving activities into all of our courses and offering opportunities to engage in scientific research both in and out of the classroom setting. We assess student performance in a variety of meaningful ways and have moved beyond standardized multiple choice exams and cookbook laboratory "experiments." We "prepare students to engage in active citizenship" by helping them to understand how and why science is relevant to our society and their future and exposing them to a variety of ways in which they can contribute as future scientists. We "prepare students to pursue meaningful work" by offering a broad curriculum (from molecules to ecosystems), teaching valuable scientific skills, and actively mentoring our students.

### **SECTION 5: DESIGN OF PROGRAMS**

The Biology Department offers three programs: the B.S. in Biology, the B.A. in Biology and the Biology minor. Our programs have undergone significant revisions over the past 10 years, including the addition of sophomore-level courses as part of our core requirements in 2002 and the transition to the four-credit model in 2007. With the transition to the four-credit model came the introduction of several courses in which the laboratory component is integrated into the lecture component.

## *COURSE NUMBERING AND SEQUENCING RATIONALE*

100-level courses: introductory courses; no pre-requisites; may be taken in any sequence; however, typically incoming freshmen take BIO 110 (only offered in fall) followed by BIO 111 (only offered in spring); labs are integrated with lecture

200-level courses: sophomore-level courses that require BIO 110 and 111 as prerequisites; BIO 210 Ecology is only offered in fall, while BIO 211 Genetics and 212 Cells and Physiology are offered only in spring; all courses have labs integrated into the lecture

300 and 400-level courses: for majors that have completed their 100 and 200-level requirements; typically 400-level designation signifies that senior standing is recommended (but not required), BIO 495 Senior Seminar is offered in fall of the senior year

Note: A recommended course sequence for students in the B.S. Program and planning sheets for the B.S., B.A., and Minor programs in Biology are included in the appendices.

## *BIOLOGY, BACHELOR OF SCIENCE*

The Bachelor of Science program in Biology is designed to stimulate intellectual and personal growth through an examination of the fundamental properties of living systems, the application of experimental and descriptive methods of discovery, and the consideration of the social, ethical, and aesthetic aspects of biological knowledge. The B.S. program also provides undergraduate preparation for technical employment or post baccalaureate study in graduate school, or professions such as medicine, dentistry, veterinary medicine, teaching, and natural resource management. A Biology major considering graduate or professional school should confer with a Biology advisor to plan a program to meet the student's specific needs and assure entrance into such a school.

*Major Requirements = 76 credits*

### Core Courses (24 credits)

- BIO 110 Molecules and Cells\*
- BIO 111 Evolution\*
- BIO 210 Ecology
- BIO 211 Genetics
- BIO 212 Cells and Physiology
- BIO 495 Senior Seminar

\* Students must earn grades of C or higher in both BIO 110 and BIO 111 in order to take any 200-level or higher BIO course.

### Upper-Level Courses (24 credits)

*Take one course from each of the following four categories (16 credits).*

#### Animal Diversity

- BIO 333 Invertebrate Zoology
- BIO 334 Vertebrate Zoology
- BIO 335 Ornithology

#### Plant and Microbial Diversity

- BIO 363 Plant Biology
- BIO 365 Plant Evolution
- BIO 367 Microbial Diversity

#### Ecology and Evolution

- BIO 343 Ecosystem Ecology
- BIO 345 Animal Behavior
- BIO 347 Plant Physiological Ecology
- BIO 349 Population Genetics

#### Cell/Molecular/Physiology

- BIO 371 Ecophysiology
- BIO 373 Neurobiology
- BIO 375 Biochemistry
- BIO 376 Molecular Biology
- BIO 377 Immunology
- BIO 379 Comparative Animal Physiology

#### Upper-Level Elective Courses

*Choose any two 300- or 400-level BIO courses to bring total credits in Biology to 48 credits*

#### Related Science/Math Courses (28 credits)

- CHEM 111 General Chemistry I
- CHEM 112 General Chemistry II
- CHEM 221 Organic Chemistry I
- CHEM 222 Organic Chemistry II
- PHYS 141 College Physics I
- PHYS 142 College Physics II
- MATH 141 Introductory Statistics

#### Electives

*Select additional courses to reach a total of 122 credits for the degree.*

For a dual major in Education, please refer to the appropriate Education program option.

#### *BIOLOGY, BACHELOR OF ARTS*

The Bachelor of Arts in Biology provides an introduction to the discipline and an opportunity to integrate the study of Biology with another field. In contrast to the B.S. program, the B.A. requires fewer credits in both biology and related sciences, permitting a student to complete a second major or additional courses in another discipline such as Chemistry, Psychology, Elementary Education, Journalism, Art, Management, or Computer Science; thus, it satisfies the needs of students with a combination of interests.

*Major Requirements = 52 credits*

#### Core courses (20 credits)

- BIO 110 Molecules and Cells\*
- BIO 111 Evolution\*
- BIO 210 Ecology
- BIO 211 Genetics
- BIO 212 Cells and Physiology

\* Students must earn grades of C or higher in both BIO 110 and BIO 111 in order to take any 200-level or higher BIO course.

#### Upper-Level Courses (16 credits)

*Take one course from each of the following four categories (16 credits).*

##### Animal Diversity

- BIO 333 Invertebrate Zoology

- BIO 334 Vertebrate Zoology
- BIO 335 Ornithology
- Plant and Microbial Diversity
  - BIO 363 Plant Biology
  - BIO 365 Plant Evolution
  - BIO 367 Microbial Diversity
- Ecology and Evolution
  - BIO 343 Ecosystem Ecology
  - BIO 345 Animal Behavior
  - BIO 347 Plant Physiological Ecology
  - BIO 349 Population Genetics
- Cell/Molecular/Physiology
  - BIO 371 Ecophysiology
  - BIO 373 Neurobiology
  - BIO 375 Biochemistry
  - BIO 376 Molecular Biology
  - BIO 377 Immunology
  - BIO 379 Comparative Animal Physiology
- Related Science/ Math Courses (16 credits)
  - CHEM 111 General Chemistry I
  - CHEM 112 General Chemistry II
  - MATH 141 Introductory Statistics
- One of the following:
  - PHYS 141 College Physics I
  - GEOL 201 Introductory Physical Geology

#### Electives

*Select additional courses to reach a total of 120 credits.*

For a dual major in Education, please refer to the appropriate Education program option.

#### *BIOLOGY MINOR*

Designed to permit students majoring in another field to pursue a program of study in the life sciences, this minor includes a set of core courses that introduce the most important concepts in biology as well as upper-level electives dictated by the personal interests of the student.

*Minor Requirements = 24 credit*

- Core Courses (20 credits)
  - BIO 110 Molecules and Cells\*
  - BIO 111 Evolution\*
  - BIO 210 Ecology
  - BIO 211 Genetics
  - BIO 212 Cells and Physiology

\* Students must earn grades of C or higher in both BIO 110 and BIO 111 in order to take any 200-level or higher BIO course.

Upper-level elective course (4 credits)

*Choose any 300- or 400-level BIO course to bring total credits in Biology to 24 credits*



One of the first observations one might make about our B.S. program is that there are no specialized tracks within the program and that all of our majors are required to take a broad diversity of coursework. This design is intentional and reflects the general philosophy of the KSC Biology faculty that exposure to and appreciation of the many sub-disciplines of biology is beneficial to our students and to the field and is highly compatible with the liberal arts mission of the College.

Biology is an interdisciplinary science which requires a firm grounding in the physical, as well as the life, sciences. The rationale for requiring certain courses (including those in other disciplines such as Math, Chemistry, and Physics) while allowing for the election of others was the subject of much discussion when Biology transitioned to the four credit model, necessitating a decrease in the number of required courses. Requirements for biochemistry and a semester of calculus were dropped from the new B.S. program. Almost all graduate programs in biology-related fields and many professional programs (medical, dental, and pharmacy schools) require a year of organic chemistry, a year of physics, and a statistics course. A few do require biochemistry and/or a semester or year of calculus. Students who want to be as broadly prepared as possible are advised to take biochemistry (which also fulfills a category requirement) and a year of calculus.

In addition, we currently require students to select upper-level courses from four different categories: animal diversity, plant and microbial diversity, ecology and evolution, and cell/molecular/physiology to ensure they are broadly exposed to and appreciate the contributions of the many subdisciplines of biology

SINCE OUR LAST PROGRAM REVIEW, FOUR SIGNIFICANT CHANGES IN OUR PROGRAMMATIC DESIGN HAVE OCCURRED:

- 1) Sophomore-level core course requirements were added in 2002. The sophomore curriculum was added to introduce a more developmental approach to teaching biology after faculty struggled teaching upper-level courses to a combination of sophomores, juniors, and seniors. The sophomore curriculum itself has undergone some changes since its implementation. Most notably, we moved from requiring four lecture courses (Genetics, Ecology and Evolution, Physiology of Plants and Animals, and Cell Biology) and two of four possible laboratory courses (Experimental Genetics, Ecology and Evolution Lab, Experimental Physiology, and Research Rotations) to now requiring three integrated lab/lecture core courses (Genetics, Cells and Physiology, and Ecology). The result of this change is that now every sophomore class has a laboratory component.
- 2) A 2-credit senior capstone course was added in 2002. The senior seminar was originally introduced as “a capstone experience that refines basic skills and concepts through an exploration of specific themes in scientific literature.” With the implementation of the four-credit model in 2007, it was transformed into a four-credit capstone course where students advance their experience and knowledge, recognize their important roles as scientists, and prepare for professional careers and post graduate opportunities. The course was also moved from the spring to the fall of the senior year to provide more timely help with post-graduate planning.
- 3) In 2007, along with the rest of the College, Biology moved to a four-credit model. At that time, several courses were implemented in which lab and lecture activities were integrated. This movement to integrated laboratory lecture classes in which classes typically meet in our teaching for either lecture or

lab or a mixture of activities is likely to be one of our most innovative curricular revisions. It evolved from our collective impression that, in comparison to lecture, lab activities were undervalued. Separate lab courses were typically worth much fewer credits than the corresponding lecture course at a time when trends in science education were calling for more hands-on experiences in the sciences. Integration allows for better coordination of lecture and lab activities and reduces the workload of students who now manage fewer courses than when labs were separate courses. Integration of lab activities also avoids one of the problems experienced by science faculty at KSC, the undervaluing of lab courses when determining teaching loads. Although our labs have evolved from standard cookbook-type labs to those that are inquiry-based and multi-dimensional, the College does not count, for example, a four hour lab experience as four hours of teaching. The effectiveness of integrative lab/lecture experiences is hard to assess at this point because we are still in the process of adapting our courses and finding the right balance between the lecture and laboratory components.

- 4) As part of the implementation of the four credit model, the introductory sequence for majors was revised. The introductory sequence transitioned from Life: Diversity (fall) and Life: Processes (spring) to BIO 110 Molecules and Cells (fall) and BIO 111 Evolution (spring). In addition, to revision of course content, the new introductory course sequence has integrated lab with lecture activities.

## SECTION 6: CONTRIBUTIONS TO INTEGRATED STUDIES PROGRAM (ISP)

The Biology Department has always had a strong commitment to non-majors courses and contributed significantly to the former General Education and current Integrated Studies Programs (implemented in fall 2007). We have developed new courses for the Integrated Studies Program including for both of the Foundations courses: ITW Thinking and Writing and IQL Quantitative Literacy and for the Perspectives (INBIO) courses. The only ISP category to which we have yet to contribute is the interdisciplinary (II) perspective courses.

*Table 6.1. Numbers of ISP sections offered by Biology since 2007. Note that the final column (Fall 09) provides data for a single semester.*

ISP Category	AY 2007/08	AY 2008/09	Fall 09
Thinking and Writing	2	0	1
Quantitative Literacy	1	1	0
Perspectives INBIO 100-level	25	15	10
Perspectives INBIO 104	6	5	0
Perspectives INBIO 300-level	0	2	5

We offer two different types of 100-level Perspectives courses (INBIO 100 and INBIO 104). The INBIO 104 course offerings provide significant laboratory experiences for non-majors (including education majors). One of the 100-level offerings (Tropical Marine Biology) provides a significant study abroad component. The

Department plans to expand its non-majors study abroad options. As seen in Table 7.1, the Biology Department has responded to the call for more 300-level Perspectives offerings in AY 09/10.

The titles for the various courses that have been offered under the five categories listed above, their catalog descriptions (INBIO only), and the faculty responsible for developing and teaching them are listed below.

*Note: Full-time, tenure track faculty have an asterisk next to their name.*

#### ITW 101 Thinking and Writing

A Brave New World is Here (Susan Whittemore\*)

Plants in Science and Literature (Kristen Porter-Utley\*)

#### IQL 101 Quantitative Literacy

Counting on Conservation (Karen Cangialosi\*)

#### INBIO 100 (and 103) Topics in Biology

Catalog Description: An exploration of biological issues and methods for nonmajors. Applying basic principles to modern problems, the course may focus on a theme such as evolution and conservation of biodiversity, plants and society, or ecology and environmental issues. Can be repeated for elective credit but not ISP credit as topics change. Fall, Spring.

New Perspectives (Julia Imberato)

Plant Diseases (Carolyn Wheeler)

Topics in Human Development and Aging (Robert Anzalone)

Conservation of Natural Resources (Davis Chesemore)

Plants and Human Affairs (Kristen Porter-Utley\*)

Evolution and Genetics of Sex (Ken Bergman\*)

Biology of Plagues (Loren Launen\*)

Genetics and Society (Scott Strong\*)

Introduction to Human Physiology (Nancy McDade)

Tropical Marine Biology (Karen Cangialosi\*)

Tropical Biology (Cliff Lerner\*)

Barely Tolerating Yourself (Scott Strong\*)

Body Systems (Todd Jarry)

Mad Dogs, Mad Cows, and More (Sue Piscopo)

#### INBIO 104 : Lab Biology Topics

Catalog Description: An integrated lecture-lab course for nonmajors that explores biological topics through hands-on investigative activities. Will focus on a theme, such as marine biology or ecology. Can be repeated for elective credit but not ISP credit as topics change. Will satisfy the lab science requirement for education majors. Fall, Spring.

Freshwater Ecology (Patrick Eggleston\*)

Biology of Plagues (Loren Launen\*)

#### INBIO 300: Advanced Topics in Biology

Catalog Description: Topics in the biological sciences such as genetics, health, ecology, and others will be explored at an in-depth level. Socially relevant and ethical issues such as AIDS, genetic engineering, embryo research, environmental crises and other issues will be emphasized. Prerequisite: 24 credits in ISP, including ITW 101 and IQL 101. Fall, Spring.

Evolution and Genetics of Sex (Ken Bergman\*)

Barely Tolerating Yourself (Scott Strong\*)

The A.R.T. of Reproduction (Sue Piscopo)

It is important to note that many of these courses are taught by full-time, tenure-track faculty and the offerings are both creative and diverse. It should be evident that the contributions of the Biology Department to the Integrated Studies Program are significant and numerous and that they reflect our ongoing commitment to scientific literacy for all students in support of the liberal arts mission of the College and our own Biology mission statement. This commitment is also reflected in our job ads which make clear that there is an expectation of all new faculty to develop and offer an ISP course.

## SECTION 7: CONTRIBUTION TO OTHER ACADEMIC PROGRAMS ON CAMPUS

In addition to serving students who major or minor in Biology, the Biology Program serves students who major in Chemistry, Environmental Studies, Health Sciences, Education and General Science, Individualized Majors and fulfills an important role in providing courses for the Integrative Studies Program required of all KSC students. Table 7.1 describes the Biology courses taken by majors in the areas most strongly served by Biology, and provides the number of students that are declared in those majors as of 2008.

*Table 7.1. Biology Program Contributions to Most Relevant Majors.*

Major	Biology Course	Number of Students in Major (declared as of 2008) <sup>1</sup>
Health Sciences (BS)	Human Anatomy and Physiology (BIO 230 and 232) <sup>2</sup> Cell and Microbial Biology (BIO 240) <sup>3</sup>	201 (all Health Science majors) 112 (nutrition option only)
Chemistry (BA/BS)	Cells and Molecules (BIO 110)	13
Environmental Studies (BS)	Evolution (BIO 111) <sup>4</sup> , Ecology (BIO 210) <sup>4</sup> Ecosystem Ecology (BIO 343) <sup>5</sup> or Plant Physiological Ecology (BIO 347) <sup>5</sup>	26 (all Environmental Studies majors) 14 (Environmental Studies majors who are pursuing the Environmental Science option <sup>3</sup> )
General Science (BS)	Cells and Molecules (BIO 110), Evolution (BIO 111), Ecology (BIO 210)	4

<sup>1</sup>Source KSC Factbook at <http://www.keene.edu/ir/>, 2008.

<sup>2</sup> Courses required of all Health Science majors.

<sup>3</sup> Course required of Health Science majors who are enrolled only in the Nutrition option.

<sup>4</sup> All Environmental Studies majors as of 2008 were required to take these courses.

<sup>5</sup> Environmental Studies majors who opted for the Environmental Science path must take either Ecosystem Ecology (BIO 343) or Plant Physiological Ecology (BIO 347)

Support for the education programs has changed considerably in the last four decades in reflection of changes in methods and approaches in the areas of both science and education. Historically the Biology Program has been well connected to the Education program at KSC; indeed, as described in Section 1 the Biology Program originated as a concentration area for the KSC secondary education Program in AY 1964/65. Currently the Biology Program serves Education students in three main ways: 1) Students choose the Biology BA or BS as the second content area major for Education students, 2) Biology coursework is prescribed for the General Science content area major (see Table 7.1) and 3) Graduates of the Biology majors (BA or BS) subsequently

enroll in either the Post Baccalaureate Teacher Certification or Masters Degree and Teachers Certification option provided by Education. With regard to 1) Table 7.2 depicts the relationship between Education major and Biology or General Science as a content area major, with regards to the resulting NH State Certification Education students can achieve. As of AY 08/09 there are two students double majoring in Biology (BA) and Secondary Education.

*Table 7.2. Education and Content Area Major Combinations and Resulting Options in NH State Certifications Supported by the Biology Program.*

<b>Majors</b>	<b>Certification (Grade level, subject)</b>
Biology and Secondary Education	Grades 7-12, Biology
Biology + Elementary	Grades K-8 (all subjects)
Biology + Early Childhood	Birth-Grade 3 (all subjects)
General Science + Secondary Education	Middle School (grades 5-9), General Science
General Science + Elementary	Grades K-8, (all subjects)
General Science + Early Childhood	Birth-grade 3, (all subjects)

The Teacher Certification program provides a Post-Baccalaureate Teacher Certification Program which allows students to receive NH State Certification for teaching Biology to Grades 7-12. This is an Education Program offered by KSC to qualified candidates, further described at: <http://www.keene.edu/catalog/programs/grad/pbac.cfm>. Students can also apply for a Master's in Education linked with a Certification Program, described at <http://www.keene.edu/catalog/programs/grad/master.cfm>. As of AY 08/09 there is one student enrolled in the Post-Baccalaureate Teacher Certification Program in Biology.

From time to time students at KSC choose to pursue the Individualized Major the College provides and work with a Biology faculty advisor to design a major that focuses on Biology. Typically these students will also work with an advisor in another area, such as Health Science or Psychology, to structure their major. An example of such an individualized major combining Biology and Psychology to obtain sufficient qualifications as to allow the student to pursue entrance to medical schools and MD/PhD programs is included in the Appendix. The particular student was successful in gaining entrance from several medical school programs and two MD/PhD programs, and managed to complete his KSC undergraduate degree in only three years. The work of the Biology faculty advisor in this case, who both helped the student to design their individualized major, and provided the student with the opportunity to pursue research opportunities within the faculty member's research program, was an integral to the student's successful entrance to the MD/PhD program of their choosing.

The Biology Program contribution to the KSC ISP program is discussed in Section 6 and includes a description of the courses offered and their enrollments.

## SECTION 8: COURSES OFFERED AND STUDENTS SERVED

The Biology B.A., B.S. and minor were described in section 5. Table 8.1 describes enrollment in the Biology Program within the B.A. and B.S. and the Minor, as well as enrollment in the total Biology courses offered by student number and total credit hours (Fall semester only), from the time of the last Program review in 1999 to the present. Figure 8.1 depicts the enrollment number of Biology majors graphically to better represent trend in numbers of majors. In the past 10 years the enrollment in Biology majors has increased from 40 in 1999 to 74 in 2009, representing an almost two-fold increase. The proportion of students choosing the B.S. versus the B.A. has increased from 0.65 to 0.78 in the same time period as the BS degree continues to gain in popularity. Although we have no survey or other data to support this, Biology faculty report anecdotal evidence indicates that the increasing popularity of the B.S. degree relative to the B.A. is because students perceive the more rigorous requirements (greater course number) of the B.S. may better prepare them for a future career in the sciences. The number of students obtaining a minor in Biology has not changed significantly in the past 10 years (Table 8.1).

*Table 8.1: Biology Program Enrollment (1999 – 2009)<sup>1</sup>*

Year	Fall only – # of Students Enrolled in Biology Courses	Fall Only – Total Credit Hours	Declared Majors BA <sup>2</sup>	Declared Majors BS <sup>2</sup>	Declared Minors	Graduating Seniors - BA	Graduating Seniors - BS
1999	1248	3612	14	26	4	7	18
2000	1190	3128	8	28	4	10	9
2001	1087	2966	6	25	5	4	4
2002	1164	2983	4	25	3	0	7
2003	1240	3317	6	32	3	1	15
2004	1218	3422	2	35	3	2	8
2005	1174	3225	4	45	4	5	9
2006	1177	3224	12	38	3	1	9
2007	849	3396	11	40	2	7	12
2008	919	3664	11	51	6	10	11
2009	na	na	16	58			

<sup>1</sup>Source: <http://www.keene.edu/ir>, factbooks and personal communication Tom Richards).

<sup>2</sup> Includes students pursuing a second major.

na – data not available at the time of writing.

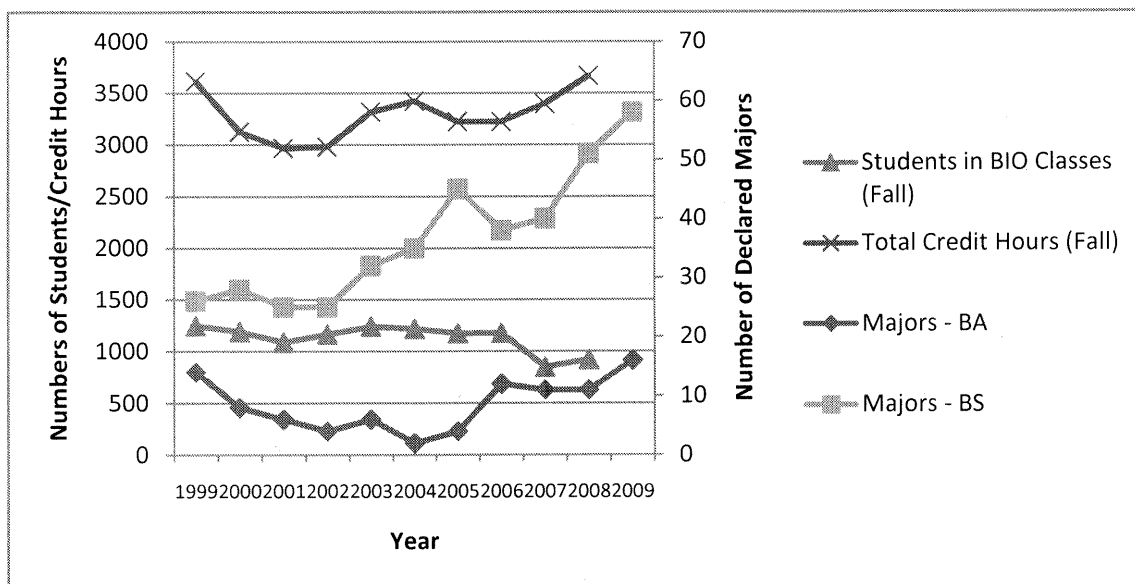


Figure 8.1. Trends in the number of students enrolled in Biology classes by student number and credit hours. Data for total student number and credit hours is based on fall semesters only (left vertical axis) and thus does not include Fall 09 data. Number of declared majors (right vertical axis) includes declared majors up to and including Spring 09.

Examination of the number of total students enrolled in Biology courses and the number of total credit hours (fall semester only) over the past 10 years (Table 8.1 and Figure 8.1) indicates that although there has been some fluctuation over the past decade, in general the numbers remain relatively constant. The impact of the 4 credit model (implemented in 2007) which reduces the total number of classes that students take while increasing the number of credits for many of those classes from 3 credits to 4 credits, is apparent when one examines the decline in the number of students in biology classes in 2007 (relative to 2006) which is concomitant with an increase in total credit hours. In general the number of students, and the number of total credit hours, are not markedly altered in the past 10 years although there is some suggestion of increased numbers for both in the last two years.

Table 8.2 depicts the student enrollment in “core” Biology courses from Fall 2001 to Spring 2009 and was constructed using data provided by Institutional Research (see Appendices for raw data). Enrollment trends are difficult to determine given the changes in the Biology Program resulting from the conversion to the four credit model and concomitant re-design of the Biology Program. However, a general trend towards increased enrollment in all of the core courses in the years 2007 – 2009 (where data is available) is suggested. Table footnotes explain some anomalies in enrollment. Enrollment in courses provided for the ISP program is provided in Section 6.

Table 8.2. Student Enrollment in Core Biology Courses From Fall 2001 to Spring 2009.  
Data Source: Institutional Research, raw data provided is included in the Appendices.

Courses <sup>1</sup>	Year								
	2001 <sup>2</sup>	2002	2003	2004	2005	2006	2007 <sup>3</sup>	2008	2009 <sup>4</sup>
<b>100-Level</b>									
Life Diversity/Evolution	79	80	92	87	77	98	34	105	125
Life Processes/Cells&Molecules		80	75	72	75	68	185	106	
<b>200-Level</b>									
Genetics		33	33	21	34	23		44	38
Ecology&Evolution/Ecology	22	23	34	30	36	28	44	62	
Cells/Cells&Physiology		16	22	22	20	20	24	41	28
<b>Upper Division</b>									
<b>Senior Seminar</b>						13	9	9	

<sup>1</sup> Students in the Biology BA, BS and minor must take the 100 and 200 level core courses. Only students in the Biology BS must take the Senior Seminar. Life Processes was re-designed and became Cells and Molecules which was implemented in 2007 as part of the new 4 credit program. Likewise, Life Diversity was re-designed into Evolution in 2007. Cells became Cells and Physiology in 2006. Senior Seminar was instituted in 2006 as part of the program re-design of 2005.

<sup>2</sup> Only Fall 2001 data was provided by Institutional Research, thus, as Life Processes and Cells were Fall courses there is no enrollment provided.

<sup>3</sup> The new program accompanying the conversion to the four credit model was implemented in Fall of 2007. Accordingly, enrollment in Life Processes/Cells and Molecules was elevated because the course was offered in both Spring and Fall of 2007. Likewise, Genetics, which has previously been offered in the Fall, was not offered for one full year (not in Spring or Fall of 2007).

<sup>4</sup> Only Spring 2009 data was available at the time of this writing, thus there are no 2009 enrollments for Cells and Molecules or Ecology which are both Fall course offerings.

Table 8.3 depicts the balance of courses available through the Biology program with regards to the number of upper and lower division courses. As described in section 1, in the past 10 years the Biology Department has changed its curriculum significantly on two separate occasions, once in 2000/2001 and again in 2007/2008. The change in 2000/2001 resulted in the implementation of a developmental, student-centered approach where courses in Biology were prescribed at the 100 and 200 level, providing the foundation for subsequent courses at the upper level. At this time, as described In 2007/2008 the new program furthered the effort to make the program more student centered and streamlined by reducing the total number of courses, maintaining the developmental approach, and removing the requirements for Calculus and Biochemistry from the BS to allow students more choice in their coursework and flexibility in their scheduling. Students who are interested in pursuing graduate studies (which typically require Calculus and often Biochemistry) are advised to take these courses in preparation, but all students in the BS are now given the choice. All Biology faculty teach a combination of core courses (100 or 200-level) and upper-level courses.



Table 8.3. Balance of Upper and Lower Division Courses<sup>1</sup> in the Biology Program as listed in the Keene State College catalog (1999 – 2009).

Academic Year	# of Lower-division courses (1XX or 2XX)	# of Upper-division courses (3XX or 4XX)	Total number of courses <sup>1</sup>	Ratio of Lower to Upper Division Courses
1999/2000	14	34	48	0.41
2000/01, 2001/02	20	30	50	0.67
2002/03	20	28	48	0.71
2003/04	22	25	47	0.88
2004/05 & 2005/06 & 2006/07	22	25	47	0.88
2007/08 <sup>2</sup> & 2008/09	16	20	36	0.80

<sup>1</sup>Defining "course" as the number of Biology courses listed in the KSC Catalog, including 1 credit lab courses.

<sup>2</sup> This year was the first year where the four credit curriculum and biology program were implemented.

## SECTION 9: STUDENT LEARNING OUTCOMES

The student learning outcomes for the Biology program are included in the Appendices and listed in section 3 of this document. The mission of the Biology Department states that “through our programs, students will develop an understanding of all forms of life, their evolutionary histories and relationships, and their interactions at levels of integration ranging from the molecular to biospheric.” Learning outcome I directly addresses this aspect of our programmatic mission by stating students will be able to demonstrate understanding in the following fundamental areas of biology: biological diversity (the various forms of life and their relationships), evolution, sub-organismal biology (from the molecules of life to organ systems), organismal biology (individual species and their traits), and supra-organismal biology (populations, communities, ecosystems, and biomes). Learning outcome II states that students understand the many aspects of the scientific process which relates directly to our mission to “teach students the scientific method, a mode of inquiry involving rational observation, experimentation, and critical analysis.”

The communication of scientific knowledge, included in outcome II as well as outcome III, is important to the scientific process and preparation of our students for “graduate programs in biology and for a broad-range of biology-related careers.” Finally, learning outcome IV which states that students will develop intellectual independence, scientific literacy, and an appreciation for the connections between biological science and society directly supports the liberal arts mission of Keene State College and the Biology Department “through the cultivation of an appreciation of natural science and its relevance in society for all Keene State College students including non-Biology majors.”

## SECTION 10: STUDENT LEARNING OUTCOMES ASSESSMENT

As described in the current assessment plan for Biology (see appendices), three different methods for assessing student outcomes (see appendices) are employed:

- 1) To assess Learning Outcome I, we developed our own assessment exam to assess whether students demonstrate understanding of the following five fundamental content areas in the biological sciences: biological diversity, evolution, sub-organismal biology, organismal biology, and supra-organismal biology. A sixth section was added to this exam to assess to aid in the assessment of Learning Outcome II, specifically the ability to develop testable hypotheses and design experiments to test those hypotheses. The exam has been administered as part of BIO 495 Senior Seminar.
- 2) Other aspects of Learning Outcome II and Learning Outcome III (ability to think critically and communicate the results of experiments effectively) are to be assessed through a review of scientific lab reports generated in a variety of upper-level courses using a common rubric.
- 3) Learning Outcome IV, the development of intellectual independence, scientific literacy, and an understanding of the interactions between science and society are to be assessed through successful participation in BIO 495 Senior Seminar.

The Biology Department was one of the first departments on campus to develop and implement an assessment exam (in 2003). Implementation of the assessment exam (see plan in appendices) initially provided some valuable insight into what we interpreted as a significant gap in our students understanding of key concepts in evolution. Based on three years of data, as part of its transition to the four-credit model in 2007, Biology transformed one of its introductory courses, Life: Diversity, into a course titled Evolution.

Presently, however, the Biology Department is struggling with several problems with its current assessment plan. A few of these issues are as follows:

The assessment exam is lengthy and is a chore to develop, administer, and grade. The small sample size does not lend itself to statistical analysis making it difficult to interpret the results of our assessment. We have been very disappointed with student performance on the exam. Because it is administered during Senior Seminar, a course taken only by students enrolled in the B.S. program, we are not assessing our many B.A. students on their understanding of fundamental biological concepts. In addition, we currently don't allow students to study or prepare in any way for the exam (although it counts toward their grade in the course). Since most of the concepts were covered during the introductory core course sequence (with the hope they would be reinforced in later coursework), it's quite possible that students have not been exposed to the material directly and in that form for 2-3 years. Therefore, we are testing retention in addition to understanding. Revisions that will be adopted in 09/10 that may help with some of these issues include adopting the use of a purchased, standardized test. Students in the B.A. program will now be required to take Senior Seminar.

While most faculty require some sort of written report in their upper-level courses, many do not require a traditional scientific report, making it difficult to use a common rubric to assess the ability to communicate the results of a scientific experiment effectively and accurately. While all of the Biology faculty feel strongly that the outcome is an important one, none want to be required to adhere to a restrictive format for their major writing assignment for the purpose of assessment.

We are unsure of how to use participation in senior seminar effectively as an assessment tool. While the course goals and objectives are clearly in line with Learning Outcome IV, how does one assess "participation?"

It is safe to state that despite spending countless hours developing an assessment plan and exam, the Biology faculty are feeling quite dissatisfied, even frustrated, with their current program assessment strategy and are in need of guidance. We know that we are doing an excellent job preparing our students for medical school, graduate school, and employment in biotechnology and the natural sciences because they are competitive with students from other institutions and because they tell us they were well-prepared. We need a plan that provides meaningful insight into whether our students are achieving the learning outcomes we developed for our programs, a plan that can be administered efficiently and effectively. We hope to gain some insights and suggestions from the outside reviewers as a part of the program review process.

## **SECTION 11: ADVISING**

A complete academic advising plan for the Biology Department was developed and submitted to the College in Fall 2008. That plan is included in the appendices of this document.

The general strategy for advising our students starts with the use of group advising sessions in the fall of the year to discuss with interested, mostly undeclared, students the differences among the programs we offer (B.S., B.A., and the minor), to distribute advising materials (program planning sheets, recommended course sequencing, and information about the Biology Club, research opportunities in Biology, and career options), and to instruct on the procedure for declaring a major in Biology and finding a permanent academic advisor. The Chair of Biology assigns new advisees on a rotating basis to keep numbers of advisees equal among the faculty. Faculty advisors offer one-on-one advising sessions to each of their advisees during the registration periods and on an as-needed basis. Biology Senior Seminar (BIO 495) offers an additional opportunity to provide career advising and assist students with generating resumes, cover letters, and essays for post-graduate programs and employment. Current official advising loads consist of 12-15 students per FTTT faculty member.

In general, our system of advising works very well and our majors get a great deal of valuable mentoring, advice, and individual attention. The need for pre-medical advising has, however, grown dramatically over the past 2-3 years with students from disciplines other than Biology (over 20 students in 2008/09) seeking advice on getting into medical school, dental school, and physician assistant programs. This situation has created an unmanageable burden for Susan Whittemore, the unofficial pre-medical advisor, who has a full load of Biology majors to advise as well. Whittemore has worked over the past 6 years with Dartmouth Medical School on the Medical Student for a Day Program where students get to spend a day at DMS with current medical students and meet with admissions personnel. A Blackboard site called "The Health-Related Pre-Professional Network" was constructed by Whittemore to help disseminate information to interested students on how best to prepare for health-related professions. While these advising tools can be made available to students from other departments fairly easily and do help somewhat to meet the increased demand for premedical advising, it is hoped that the administration will move soon to create a pre-medical advisory committee consisting of 3-4 faculty to reduce the burden of one-on-one advising and of writing letters of recommendation.

## **SECTION 12: FULL-TIME FACULTY**

Table 12.1 describes the current Biology FTTT faculty including their educational qualifications (excluding post-doctoral experience), their current rank at KSC and areas of research and scholarship. Table 12.2 describes the current Biology FTTT teaching fields and courses offered within the past 5 years. Table 12.3 summarizes recent (since 2004) faculty service contributions and Table 12.4 summarizes recent (since 2000) grant writing activities as examples of scholarly activities. CV's included in the Appendices contain additional information

on courses taught beyond the past five years, details on scholarship including research and other activities defined as scholarship in the KSC Faculty Handbook (available at <http://www.keene.edu/admin/handbooks.cfm> ), and service contributions.

*Table 12.1. Biology FTTT Qualifications and Areas of Research and Scholarship*

<b>Faculty</b>	<b>Educational Qualifications</b>	<b>Appointed to KSC</b>	<b>Current Rank, Date Obtained</b>	<b>Areas of Research and Scholarship</b>
Dr. Patrick Eggleston	Ph.D, Zoology & Ecology, Ohio State University M.S., Pomology and Plant Physiology, Cornell University BS, Horticulture, Michigan State University	1975	Professor, 1987	Ecology, limnology, phycology, evolution, conservation of biodiversity.
Dr. Kenneth Bergman	Ph.D, Cell & Developmental Biology, Harvard University A.B. Zoology, U.C. Berkeley A.A. Biology, Bakersfield College	1979	Professor, 1993	Genetics, vertebrate zoology, ornithology, evolution, animal systematic, conservation biology.
Dr. Karen Cangialosi	Ph.D, Zoology, Miami University M.S., Biological Sciences, University of Cincinnati B.A., Biological Sciences, University of Maryland Baltimore County	1992	Professor, 2001	Behavioral ecology, population ecology, invertebrate zoology, spider behavior, tropical marine biology, women's studies.
Dr. Susan Whittemore	Ph.D., Physiology, Dartmouth College M.S., Wildlife Biology, Utah State University B.S., Wildlife Biology, S.U.N.Y. College of Environmental Science and Forestry and Syracuse University	1993	Professor, 2002	Animal physiology, endocrinology, molecular biology of invertebrate stress responses, physiology of endocrine disruption, developmental toxicology in vertebrates.
Dr. Scott Strong	Ph.D., Biological Science, Florida State University B.S., Zoology, Miami University	1998	Associate Professor, 2003	Cell and molecular biology, evolution of immunoglobulin genes, molecular biology of stress responses, ichthyology, marine tropical conservation biology.
Dr. Kristen Porter-Utley	Ph.D., Botany, University of Florida M.S., Botany with a minor in Anthropology (Specialization in Ethnobotany),	2004	Associate Professor, 2009	Evolution, plant evolution and systematics, plant biology, ethnobotany, conservation biology.

	University of Florida B.S., Environmental Horticulture, University of Florida			
Dr. Loren Launen	Ph.D., Biological Science, Simon Fraser University B.Sc. Biology (Specialization in Biomedical Toxicology), University of Guelph	2005	Assistant Professor	Environmental microbiology, microbial physiology, biochemistry and systematics, environmental analytical chemistry.

*Table 12.2. Teaching Fields and Representative Courses Taught Since 2004 by Biology FTTT Faculty.*

<b>Faculty</b>	<b>Courses Currently Taught for Biology Core/Major Requirements</b>	<b>Courses Currently Taught for ISP</b>	<b>Courses Currently Taught for Other Programs</b>
Dr. Patrick Eggleston	BIO 210 Ecology BIO 490 Aquatic Ecology	INBIO 104 Freshwater Ecology INBIO 101 Evolution and Conservation of Biodiversity	ENST 100 Intro to Environmental Studies
Dr. Kenneth Bergman	BIO 111 Evolution BIO 211 Genetics BIO 334 Vertebrate Zoology BIO 335 Ornithology	INBIO 105 Evolution and Genetics of Sex, INBIO 300 Evolution and Genetics of Sex	
Dr. Karen Cangialosi	BIO 111 Evolution BIO 210 Ecology BIO 333 Invertebrate Zoology BIO 345 Animal Behavior BIO 490 Advanced Tropical Marine Biology Senior Seminar BIO 495	INBIO 104 Tropical Marine Biology IQL 101 Counting on Conservation	WS 495 Women's Studies Capstone
Dr. Susan Whittemore	BIO 110 Cells & Molecules BIO 212 Cells & Physiology BIO 379 Comparative Animal Physiology BIO 371 Ecophysiology BIO 490 Endocrinology & Endocrine Disruption Senior Seminar BIO 495	INBIO 104 Exploring Genes ITW 101 A Brave New World is Here	
Dr. Scott Strong	BIO 110 Cells and Molecules BIO 375 Biochemistry BIO 376 Molecular biology BIO 377 Immunology	INBIO 101 Barely Tolerating Yourself	
Dr. Kristen Porter-	BIO 111 Evolution BIO 363 Plant Biology	INBIO 100 Plants and Human Affairs	

Utley	BIO 365 Plant Evolution	ITW 101 Science & Literature of Plants	
Dr. Loren Launen	BIO 110 Cells and Molecules BIO 211 Genetics BIO 367 Microbial Diversity BIO 490 Microbial Ecology	INBIO 101 & 104 Biology of Plagues	BIO 290 Cell and Microbial Biology

*Table 12.3. Biology FTTT faculty representative service contributions since 2004 (please see CVs for complete detail and for service pre-dating 2004)*

<b>Faculty</b>	<b>Departmental Service</b>	<b>School Service</b>	<b>College Service</b>	<b>Community Service<sup>1</sup></b>
Dr. Patrick Eggleston	Microscope Comm, DPEC member-Launen	School Curriculum Comm		Ashuelot River Local Advisory Comm, Ashuelot River cleanup project, Ashuelot River Monitoring activities, Keene Wetland Comm, Keene Surface Water Protection Comm, author Surface Water Protection Comm Report to City (Keene)
Dr. Kenneth Bergman	Microscope Comm, Microbiology Search Comm, Biology Assessment Comm, DPEC member - Launen & Porter-Utley, DPEC chair - Launen & Gebauer	DPEC member Abernethy (Chem)	NEASC Steering Comm, Chair NEASC Std 5 Comm, Thorne Art Gallery Advocacy Comm, KSC IACUC	Crotched Mtn Rehabilitation Center I.R. Board
Dr. Karen Cangialosi	Biology Dept. Chair, Search Comm (9 searches, see CV)		Women's Studies Program Coordinator, Co-chair Campus Commission on Diversity and Multiculturalism, Co-chair of organizing committee for the Keene State College Fourth Biennial World Affairs Symposium entitled, Globalization: Impact on Peoples of	American Arachnological Society, Treasurer and host of 2001 National Conference, Co-chair, Southwest NH chapter of GLSEN (gay, lesbian and straight education network), Campus Coordinator for New England Board of

			the World, Nov 3 – 5, 2005, Co-chair of the President's Commission on the Status of Women, Search comm. (Womens Studies), Council for a Sustainable Future	Higher Education Science/Engineering Academic Support Network for minority students, Organizer World Aids Day Activities
Dr. Susan Whittemore	Interim Chair, DPEC Chair - Kolodziejski, Porter-Utley, Launen,, Search Chair (Microbiology, Neurobiology), co-author Program Review	DPEC member – Abernethy (Chem), DPEC Director of Writing	FEAC, ISP Assessment Sub Comm (Ethics Outcome, Writing Perspectives Outcome)	State of NH Pesticide Review Board Member, Keene Conservation Comm
Dr. Scott Strong	Department Chair, Neurobiology Search Comm, Biology Club Advis, Biology Hnr Society Advis	Science Center Facility Planning Comm, Science Center Fundraising Comm, Assistant Dean SSSS	IACUC Chair, Faculty Athletic Rep. To NCAA, Integrative Studies Program Council, Summer Orientation	Keene High School Science Teacher Search Comm.
Dr. Kristen Porter-Utley	Biology Club Advisor, Assessment Comm, Search comm (A & P)	Search Comm, Dean's Assistant	Senator (College Senate), Academic Excellence Conference Comm	Ashuelot Valley Environmental Observatory Board Member
Dr. Loren Launen	Search comm (A&P, Neuro), microscope comm, AOC program review co-author	School curriculum committee, Sciences Environmental Health and Safety Committee, search comm(Physics)	NEASC standard 5 committee, Search committee (Health & Safety coord, OSPR dir), URG committee, Sidore committee	Project SEED mentor (1 summer)

<sup>1</sup> Community service in a professional capacity.

Table 12.4 Faculty External Grant-Writing Activities Since 2000

Faculty	Granting Agency	Grant Description	Awarded
Dr. Karen Cangialosi	Whiting Foundation (2001)	Development Funds for Marine Biology Course	\$6,000
Dr. Susan Whittimore	NIH BRIN Grant (2004-05)	Summer Research Experience for Undergrads	\$20,000
	NIH BRIN Grant (2003-04)	Summer Research Experience for Undergrads	\$12,000
	NSF-MRI (Major Research Instrumentation) Grant (2001)	Equipment for Molecular Physiology Research	\$169,265
Dr. Scott Strong	NIH BRIN Grant (2004-05)	Summer Research Experience for Undergrads	\$20,000
	NIH BRIN Grant (2003-04)	Summer Research Experience for Undergrads	\$12,000
	NSF-MRI (Major Research Instrumentation) Grant (2001)	Equipment for Molecular Physiology Research	\$169,265
	LiCor (2005)	Matching Funds for Purchase of Automated DNA Sequencer	\$50,000
Dr. Kristen Porter-Utley	NSF-REVSYS (Revisionary Syntheses in Systematics Grant) 2008-2011	Collaborative Research; Significant Undergrad Res. Component	\$188,482 (of total grant for \$1,227,210)



## *FACULTY EVALUATION*

While the general method whereby Biology faculty are evaluated for promotion and tenure follows the College-wide standards dictated in the KSC Employee Association Collective Bargaining Agreement and in the Faculty Handbook, each Department uses slightly different methods. In general, each faculty member undergoing evaluation (yearly until tenure and then every 2 years thereafter until the rank of Professor is achieved) prepares a file describing their accomplishments in the areas of teaching, scholarship and service. This file includes teaching observations conducted by colleagues in the Biology Department and other colleagues from outside the Department, student course evaluations, a portfolio of course materials, documentation of scholarship and service and a self-evaluation written by the faculty member under evaluation. The file is reviewed by the faculty member's Departmental Peer Evaluation Committee (DPEC) which writes a letter describing the faculty member's performance. The file is then reviewed by the Dean of Science who in turn writes a letter summarizing the faculty member's performance. In the year in which a faculty member is a candidate for promotion and/or tenure the file is then submitted to the Faculty Evaluation Advisory Committee (FEAC) who reviews the file and makes a recommendation for or against the candidate that is submitted to the Provost. The Provost then accepts or rejects the FEAC recommendation, and in turn recommends or does not recommend the candidate for promotion and/or tenure to the Board of Trustees.

The promotion and evaluation process is intended to constructively assist faculty develop and to support professional excellence, as evidenced by timely promotion and the achievement of tenure.

The Biology candidates for promotion or tenure have met with success in all cases since the last program review (1999). The Biology Department is recognized campus-wide as a model of efficiency and effectiveness with regards to the promotion and tenure process as we diligently attend one another's classes for conducting peer observations and carefully, but critically, review our candidate's files to ensure that the yearly reviews of untenured faculty are completed and comprehensive.

## *FACULTY WORKLOAD*

### *Teaching assignments*

Our discipline determines individual teaching assignments after first ascertaining its course needs, and we have tried to develop regular and predictable schedule cycles for specific courses as explained in Section 5. Because almost all of our courses include a laboratory component we often schedule courses into the longer time blocks provided by the four credit model. This requirement, as well as the need to avoid conflicts between Chemistry and Physics course scheduling (which also include laboratory components and thus utilize longer time blocks) renders Biology course scheduling challenging. In view of the very labor-intensive nature of lab intensive courses, which require tremendous amounts of raw physical preparation often including mundane tasks such as dish-washing, solution preparation and animal maintenance, the Dean of Sciences has interpreted a full workload as defined by the KSCEA Collective Bargaining Agreement with much-appreciated flexibility. Full loads are typically three sections (12 credit hours) and two preparations. Thus in most semesters Biology faculty are responsible for teaching two sections of one course, and one section of another, and are rarely asked to conduct three preparations per semester. 12 credit hours can translate to 12 - 15 hours per week of contact time because the teaching of laboratories is undervalued by the College and remains an ongoing issue for Science

faculty who work more hours than their colleagues in Arts and Humanities, for example. In addition, preparation for laboratories is very time-intensive and there is no compensation for this preparatory work.

### *Independent Study*

A concern held by all Biology faculty is the lack of recognition or compensation for teaching Independent Study courses to students. Biology is a labor-intensive field that is best learned in an educational environment that provides opportunities for extensive research experience. In today's competitive educational environment, students who wish to continue on into graduate school or other competitive areas such as medical school generally require research experience as undergraduates. The main way we can offer this to our students is to provide them with Independent Study opportunities. The number of Independent Study students is generally increasing (see Table 12.4 below), and accordingly more students are applying for and receiving Undergraduate Research Grants (URGs) from Biology in recent years. In the years 2005/06 and 2006/07 only two – three students per year typically applied for (and received) undergraduate research grants from Biology while in 2007/08 and 2008/09 students in Biology received 11 and 9 URG awards respectively. (personal communication, S. Ericson-West, Office of Sponsored Projects). These students are presenting at regional, national and international meetings and promoting both their own careers and the Biology Department at KSC.

The Biology faculty have a long history of offering such opportunities which have enabled many students graduating from our Programs to continue on to graduate or medical programs, as well as to secure high quality jobs in science-related areas. The work of offering Independent Study is substantial as students require one-on-one mentoring in order to accomplish anything on a research project and yet there is no credit given towards workload to faculty who supervise students through Independent Study. For example, one of the Biology faculty members has offered a total of 216 student credit hours in Independent Study over her 15 year tenure which is equivalent to offering a total of nine 4-credit upper-level courses with an enrollment of 6 students (the minimum number for running a course) each for free. The students have paid for these credits and the College has collected those tuition dollars, but the faculty member responsible for providing those 77 research experiences received no compensation in the form of course release, money or even recognition. There is no incentive for faculty who have achieved the rank of full professor to continue to provide these valuable experiences. The provision of undergraduate research experiences continues to be an equity and workload issue for Biology faculty.

*Table 12.4. Number of students enrolled in Independent Study (BIO 298 or 498) in Biology since 2005. Data source: Registrar's Office (personal communication, Tom Richards).*

Year	number of students	number of students	number of students <sup>1</sup>
	BIO 298	BIO 498	CHEM 498
2005	0	8	1
2006	0	6	
2007	1	13	

2008	3	16	1
2009	3	10	1

<sup>1</sup>CHEM 498 independent study projects are conducted with the permission of and in collaboration with the Chemistry department.

### *Reassigned Time and Workload*

Some Biology faculty have reassigned time to perform vital College functions. These have recently included: Departmental Chair reassigned time (2 courses per year), Assistant Dean reassigned time (2 courses per year), and Grant-writing reassigned time (1 course per year) and reassigned time paid for through federal grant money for the conduct of research (1 course per year).

### *Workload Issues of Note Since 2005*

In the past few years the general consensus amongst Biology faculty is that our workload is rapidly increasing. The major reasons for increased workload in the last few years are 1) faculty/staff flux, 2) Biology Program revision, 3) ISP Program implementation and assessment, 4) program assessment planning and work, and 5) time required to implement the new equipment and utilize the new space of the Science Center.

Our department has experienced significant flux in faculty and support staffing in recent years. In the last six years we have experienced four faculty losses (one retirement, one death, one resignation and one 0.5 faculty reassignment, see Table 12.5 for specific detail) and have conducted four searches. We will conduct a search in AY 09/10 to replace a colleague who died. With the recent loss of a half position to the Environmental Science Department, we are deeply concerned about any further losses.

*Table 12.5. Biology FTTT faculty changes since 1999*

<b>Time Interval</b>	<b>Number of FTTT<sup>1</sup> biologists</b>	<b>New hires</b>	<b>Departures<sup>2</sup></b>
1999/2000	6.5	M. Zhjera	D. Gregory <sup>2</sup>
2000 - 2001	7.5		
2001 - 2002	8.5	T. Zerucha	
2002 - 2003	8.5		M. Zhjera <sup>3</sup>
2003 - 2004	7.5		
2004 - 2005	8.5	K. Porter-Utley	T. Zerucha <sup>3</sup> B. Wise <sup>2</sup>
2005 - 2006	7.5	L. Launen	
2006 - 2007	7.5		
2007 - 2008	8.5	J. Kolodziejski	
2008 - 2009	7.5		J. Kolodziejski <sup>4</sup> , R. Gebauer <sup>5</sup>
2009 - 2010	7		

<sup>1</sup> FTTT = full time tenure track faculty positions.

<sup>2</sup> Departures due to retirement

<sup>3</sup> Departures due to resignation

<sup>4</sup> Departure due to death

<sup>5</sup> Departure due to reassignment to another department (the newly created Department of Environmental Studies).

The Department has also experienced considerable turnover in the part time lab preparatory support position, likely due to the basic nature of the position (requiring a sophisticated skill set but not offering full time pay or benefits). Thus we have had to hire a new lab preparator every year for the past four years. Hiring a lab preparator requires a yearly (in one case twice in one year) search as well as faculty time for job-specific training of the lab preparator. The lack of a consistent lab preparator has resulted in each faculty member having to perform hours of routine lab preparation and spend additional time on the maintenance of general supplies and equipment. While the faculty flux was unavoidable, the conversion of the lab preparator position to a full-time benefitted position would likely eliminate the turnover in lab preparatory we have recently endured and thereby reduce workloads considerably for Biology faculty.

In the last six years we have revised our Biology Program twice, on the second occasion this revision was the extensive conversion to a four credit model accompanied by a change to an integrated lab and lecture model described in Section 5. This required the re-design of every course offered in Biology, and most importantly, the re-design of laboratory activities to fit into the new time block model implemented College wide. This significantly increased the workload of all faculty in Biology, and support staff.

In the past three years Biology has participated in the development of the new campus-wide Integrated Studies Program which has included the designing and offering of new courses, as well as serving on committees and attending workshops to promote the development, implementation, and assessment of the ISP Program. Although, as discussed in Section 13, the insufficient number of Biology FTTT faculty has resulted in an increased reliance on non FTTT faculty (chiefly adjuncts) to teach many of these ISP courses, every member of Biology has taught at least one section of an ISP course per year since the ISP program began, continuing our tradition of supporting General Education at the College. Biology faculty have designed and implemented courses specifically for three of the four areas (discussed in Section 6) of this program in the past three years, including BIO 104 courses which contain a laboratory component and thus have extensive preparation workloads associated with them. While we embrace the new ISP Program it has increased our workload.

The new space of the Science Center, and the new equipment that has been placed in the Science Center as a result of grant writing activities and monies provided by the College, are a vast improvement on the prior decrepit Science facilities and equipment offerings. This change has resulted in a welcomed but not inconsiderable workload issue. Scientific equipment is not simple to select, purchase, implement or maintain. Keeping the laboratory environment in an adequate condition for the offering of courses and the conduct of research requires a few hours of work on the part of each faculty member in Biology on an almost weekly basis during the semester and typically during the summer as well if there are any research activities occurring. As written above, the conversion of the lab preparatory position to a full time benefitted position to include summer hours would significantly assist in this matter.

Although we generally feel that the members of our Department participate in professional development and scholarship (through research or in other manner) at a level appropriate to dedicated professional academic scientists, the general consensus amongst Biology faculty is that the increased workload discussed above is inhibiting the level of participation in professional development and scholarship to the level desired by most faculty members. For example, some faculty would like to engage in more active grant writing and be able to

supervise more students on the conduct of research projects, however the workload makes these activities very difficult to balance with excellence in pedagogy during the academic year. Increasingly, service activities such as serving on summer search committees for campus-wide positions, the NEASC process, ISP Program Development and the writing of this Program Review have demanded Biology faculty time during the summer. While the Biology faculty realize that we are technically free to refuse summer service, in the interests of good citizenship this is not always possible and thus even our non-contract and thus unpaid time is increasingly burdened in a manner that reduces our availability for professional development and scholarship. We feel that the College could improve this situation if the work of maintaining the infrastructure required for science education (such as equipment maintenance, grant writing etc.) was formally recognized as a service of benefit to the College and thereby counted towards promotion and tenure, if we had increased lab preparator support and if we received workload credit for teaching independent study.

### **SECTION 13. ADJUNCT AND OTHER NON-TENURE –TRACK FACULTY (NON FTTT FACULTY)**

#### *OVERALL ADJUNCT RELIANCE*

As of Fall 2008 non FTTT faculty (Adjuncts and contract lecturers for the purpose of this report) taught 59% of the student credit hours for all Biology courses. Figure 13.1 depicts the percent of student credit hours taught by either FTTT or non-FTTT from 2001 to 2008. This figure clearly depicts a trend towards increasing reliance on non-FTTT. Table 13.1 describes how many sections and what courses are taught by non FTTT faculty based on the academic year 2008/2009 as representative data. While the trend towards increasing reliance on adjuncts is alarming and is occurring College-wide (see NEASC report, insert link), it should be noted that course reassignments and adverse personal circumstance have contributed to this trend in Biology. In the past two years course reassignments for serving as Departmental Chair (2 courses per year), Assistant Dean (2 courses per year), and for writing grants and conducting research (1 per year) have reduced the availability of FTTT to teach as they are performing other vital College and Departmental functions. Furthermore, Dr. Johanna Kolodziejski, who was hired in 2007, was only able to teach for one year prior to her illness and death. Dr. Renate Gebauer, who was a half-time Biology faculty member, has been permanently reassigned to the new Environmental Studies Department, which further reduces the number of available Biology FTTT.

Of the 74 sections of Biology courses taught in 2008/2009 49% (36/74) were taught by non FTTT faculty. The greatest share of these was taught by Dr. Doug Smith who taught 16 sections of Anatomy and Physiology (I and II) in 2008/2009, representing 22% of all sections for all Biology courses taught in that academic year. Of the 36 sections taught by non FTTT 35 (97%) were lower-division courses.

In 2008/2009 25 sections of ISP-specific (Perspectives) courses were taught. Of these 25 courses, 18 (72%) were taught by non FTTT faculty. Academic Affairs statistics show that adjuncts taught 74% of all IS course sections in Spring, 2009 (NEASC, Standard 5 Report), thus reliance on adjuncts to teach most of the workload for ISP courses appears to be a College-wise problem and not one limited to Biology. All of these sections were for INBIO 101, a “Perspectives” lecture only course. Biology offered one upper level course in the Spring semester of 2009 taught by Dr. Todd Jarry, a contract lecturer in the Department. Dr. Jarry is a highly qualified Ph.D level medical microbiologist with post-doctoral training and was able to offer students a unique perspective in the field of medical microbiology not otherwise available to them with the FTTT faculty in the Department.

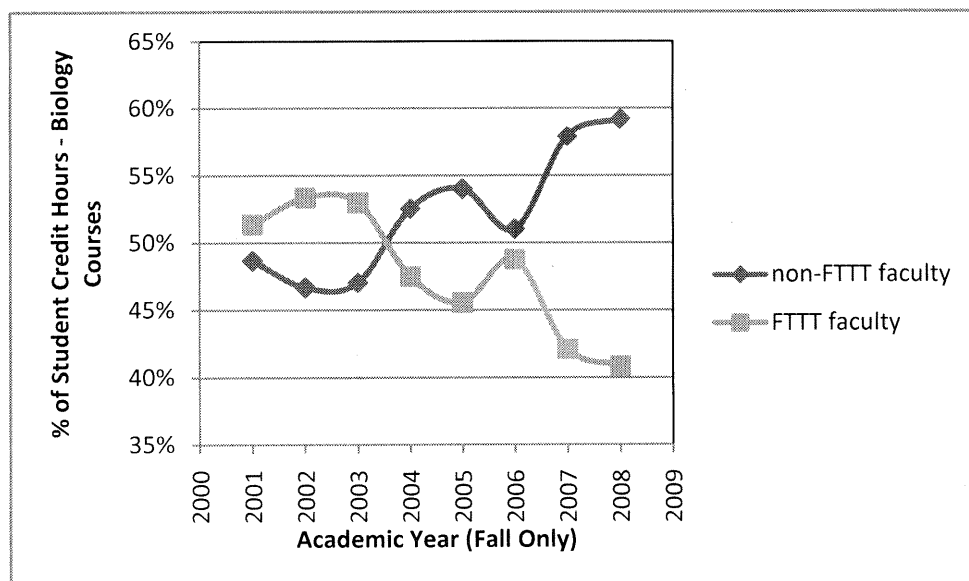


Figure 13.1. Student credit hours taught by Biology faculty in the Fall semester from 2000 to 2008. FTTT are full time tenure track faculty and non-FTTT faculty include adjuncts, contract lecturers, PATs and other non tenure track faculty.

Table 13.1. Adjunct and Non-Tenure Track Biology Faculty Description (2008/2009)

Faculty	Status	Terminal Degree	Courses Typically Taught	Total Sections
Dr. Douglas Smith	Professional and Technical Staff	Ph. D	Anatomy and Physiology I (BIO 232), Fall – 8 sections, Anatomy and Physiology II (BIO 230), Spring – 8 sections	16
Dr. Todd Jarry	Contract Lecturer	Ph.D. Molecular and Cellular Biology	Cell and Microbial Biology (BIO 240), Spring, 2 sections Fundamental Topics in Microbiology (BIO 490), Spring, 1 section	3 (Spring 09 only)
Dr. Sue Piscopo	Adjunct	Ph.D/DVM (Ph.D in Physiology & Toxicology)	Cells and Molecules (BIO 110), Fall-2 sections, Cells and Physiology (BIO 210), Spring- 1 section, Evolution (BIO 111), Spring – 2 sections	5
Mr. Clifford Lerner	Adjunct	M.S. Environmental Science	Tropical Biology (INBIO 101), Fall-1 section, Spring – 1 section	2
Ms. Julia Imbarrato	Adjunct	M.A. Science Education	New Perspectives in Biology (INBIO 101), Fall -1 section, Spring – 1 section	2
Dr. Nancy McDade	Adjunct	Ph.D. Exercise Physiology	Intro to Human Physiology (INBIO 101), Fall 1 section, Spring – 1 section	2
Ms. Carolyn Wheeler	Adjunct		Plant Diseases (INBIO 101), Fall-3 sections, Spring- 2 sections	5
Mr. David Lee Chesemore	Adjunct		Ecology and Environmental Issues (INBIO 101), Fall- 1 section	1 (Fall 08 only)
			Total	36

In recent semesters, the Department typically relies upon the work of 5 adjuncts (Piscopo, Lerner, Wheeler, McDade and Imbarrato) and one PAT (Smith) and one contract lecturer (Jarry). Table 13.1 describes the degree qualifications, the courses typically taught by these faculty, and the semester and number of sections for each based on 2008/2009 data. The Department determines the need for adjunct faculty during Departmental meetings (attended by FTTT faculty of the Biology Department only) as part of the scheduling discussions that occur each semester. The Chair of the Department is typically responsible for working with the Dean and Human Resources to develop a job ad seeking the adjunct faculty, and for interviewing and hiring candidates.

Of these seven non FTTT faculty 4 belong to the KSC Adjunct's Association (KSCAA), 1 is not yet eligible as she has not taught sufficient semesters, Todd Jarry is eligible to join the KSCEA instead as he is a contract lecturer, and Doug Smith is not eligible to join either union as he is a PAT. Adjuncts who are in the KSCAA are covered by the terms of its collective bargaining agreement which determines their pay scale. This is outlined at: [http://www.usnh.edu/hr/LaborRelations/pdf/KSCAAContract2005\\_2009.pdf](http://www.usnh.edu/hr/LaborRelations/pdf/KSCAAContract2005_2009.pdf): in Article 12. For those faculty not covered by the KSCAA collective bargaining agreement the President's Cabinet is responsible for determining compensation [personal communication, Provost, Mel Netzheimer).

Dr. Douglas Smith is currently in a term position with benefits that is classified as Professional, Administrative and Technical (PAT). The position is reappointed yearly. Dr. Smith taught as an adjunct initially but was converted to a PAT in 2007 in recognition of his excellent service and because of the high teaching load he carries in the Biology Department.

Dr. Todd Jarry has been hired into a one-year full-time position for the Academic Year 2009-2010 as a Lecturer-Contract Faculty. Since this is a one-year appointment Provost Netzhammer hired him on the recommendation of Dean Leversee, and his hiring was solicited by the Biology Department as we were familiar with his work (he had worked as an adjunct for us in the 2008/2009 academic year). The employment policy governing this type of position can be found at <http://usnholpm.unh.edu/USY/V.Pers/C.6.htm>, specifically item 6.2.15 (personal communication, Heather McGreer, Human Resources, KSC).

When conducted, evaluation of non FTTT faculty is conducted in agreement with the description in the KSC Adjunct Association (KSCAA) collective bargaining agreement for adjuncts, even in the event that the faculty is not technically an adjunct but rather a PAT (as for Dr. Douglas Smith) or a contract lecturer (as for Dr. Todd Jarry). The KSCAA collective bargaining agreement is online at: [http://www.usnh.edu/hr/LaborRelations/pdf/KSCAAContract2005\\_2009.pdf](http://www.usnh.edu/hr/LaborRelations/pdf/KSCAAContract2005_2009.pdf): see Article 11. There are in fact more restrictions on the ability to evaluate adjuncts imposed by the KSCAA collective bargaining agreement (for example, other than in the 8th and 16th semester the Departmental Chair and his/her designee can only request to observe a class if there are concerns about performance, rather than as a routine evaluation procedure) than on the observation of FTTT faculty members (as outlined in the KSCEA Collective Bargaining Agreement, Article VIII, see <http://www.keene.edu/admin/facultycontract.cfm>). The chair reviews all student evaluation forms from non-FTTT faculty at the end of the semester, and has occasional conversations about the functioning of the course during the semester with each non-FTTT faculty member. The chair also provides advice to non-FTTT faculty who seek help with particular issues or general needs. In practice, however, the combination of the restrictions on adjunct evaluation imposed by the Collective Bargaining Agreement, and the heavy workload of the Chair and other faculty members, have resulted in very infrequent evaluation of adjuncts in the Biology Department.

## SECTION 14: STUDENTS

### STUDENT DEMOGRAPHICS

Demographic data obtained from Institutional Research (see the Appendices for the raw data provided) taken from Fall semesters from 1999 to 2008 indicates that the ethnic diversity of matriculated students in the Biology Program is typical of that of the entire College (see “Factbooks” available at <http://www.keene.edu/ir/> for all data and Table 14.1 below for comparison with the “% White” category) and is dominated by “White” students who typically represent 90% of the students enrolled in the Biology Program. Institutional Research uses the following categories to describe ethnicity: A-American Indian, B-African American, C-Asian American, D-Hispanic American, E-White, F-Non-Resident Alien, G-Resident Alien, I-Mixed Race, O-Other, N or Blank-Non-Respondent. (pers. comm. Cristi Carson, Institutional Research of KSC), thus “White” indicates that the nationality is American. The data are summarized in table 14.1 below. It should be noted that data on ethnicity are based on self-reporting which results in some variability that does not necessarily reflect the actual demographic of the students in the Program (and at the College).

*Table 14.1. Ethnicity of Students Enrolled in the Biology Program. Data source: Institutional Research (Biology specific) and KSC Factbooks (College-Wide data, <http://www.keene.edu/ir/>).*

Ethnicity <sup>1</sup>	Year <sup>2</sup>									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
A	0	0	2	2	1	1	2	1	0	0
B	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	1	0
D	1	0	1	1	2	2		1	1	1
E	55	42	49	31	52	45	57	56	64	72
F	0	0	0	0	2	0	0	1	1	1
G	1	0	0	0	0	0	1	0	0	0
I	0	0	0	0	1	1	1	3	2	1
O	0	1	0	1	1	1	1	0	0	0
N/Blank	2	1	3	4	2	1	1	1		1
Total	59	44	55	39	61	51	63	63	69	78
% White	93	95	89	79	85	88	90	89	93	92
% White – KSC <sup>3</sup>	91	92	92	92	90	90	90	89	90	91

<sup>1</sup> Letters denote ethnicity as defined by KSC Institutional Research, in text above.

<sup>2</sup> Biology data is Fall only, KSC – all data (last row only) is from the entire year as in the KSC “Factbooks” at <http://www.keene.edu/ir/>.

<sup>3</sup> This category is called White/non-Hispanic in some years but always refers to Americans with regard to nationality. This data is for the entire year, not only fall semester.

Using the same raw data provided by Institutional Research as well as data available in the KSC “Factbooks” (link above), the distribution of students in the Biology Program according to gender was determined and is shown in Table 14.2. The students in the Biology Program are mainly female, with males only representing an average of 39% of the students in the years 1999 – 2008. This number has remained relatively constant in the past 10 years (since the last Program review in 1999) and is similar to that of the entire College (see last row of Table 14.2).



Table 14.2 Gender of Students Enrolled in the Biology Program. Data source: Institutional Research (Biology specific) and KSC Factbooks (College-Wide data, <http://www.keene.edu/ir/>).

Gender	Year <sup>1</sup>									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Female - Bio	33	31	35	23	42	27	37	41	39	47
Male - Bio	26	13	20	16	19	24	26	22	30	31
Total - Bio	59	44	55	39	61	51	63	63	69	78
% Male - Bio	44	30	36	41	31	47	41	35	43	40
% Male - KSC1	43	43	43	42	43	42	43	42	42	43

<sup>1</sup> Biology data is Fall only, KSC – all data (last row only) is from the entire year as in the KSC “Factbooks” at <http://www.keene.edu/ir/>).

The distribution of students according to age in the Biology Program is depicted in Table 14.3. Most students in the Biology Program are less than 25 years of age (88% as of 2008). This number has fluctuated between 77% (2002) and 90% (2006) in the past 10 years but typically tends to be somewhat lower than the College wide student demographic which is typically above 90% (as shown in the last row of Table 14.3).

Table 14.3. Age distribution of students enrolled in the Biology Program. Data source: Institutional Research (Biology specific) and KSC Factbooks (College-Wide data, <http://www.keene.edu/ir/>).

Age Category	Year <sup>1</sup>									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
17-24 - Bio	46	37	45	30	53	44	53	57	61	69
25-34 - Bio	9	5	6	6	3	3	5	4	6	8
35+ - Bio	3	2	4	3	5	4	5	2	2	1
Unknown - Bio	1	0	0	0	0	0	0	0	0	0
Total - Bio	59	44	55	39	61	51	63	63	69	78
% Under 25- Bio	78	84	82	77	87	86	84	90	88	88
% Under 25 - KSC Undergrads	90	91	92	93	84	93	94	94	95	96

<sup>1</sup> Biology data is Fall only, KSC – all data (last row only) is from the entire year as in the KSC “Factbooks” at <http://www.keene.edu/ir/>).

The College maintains home addresses for all students in the “Datatel” database system. This information is used to generate data on the “home states” for students. It should be noted, that if non-resident aliens (category F, as in Table 14.1 and text above) list an address that is within the US, then that will be considered the “home state”, therefore the utility and accuracy of this information is questionable, nonetheless, it is used in evaluating student demographics at KSC and was the source of information provided for the writing of this report. Using this information, the distribution of Biology student’s home states are depicted in Table 14.4. Most of the students in the program provide an address within the state of New Hampshire. The second most common home state is Connecticut. The majority of students list states within the New England region. This is comparable to similar data included in the KSC Factbooks (link above) for the entire College student population.

Table 14.4. Home state for Biology students in the Fall semester. Data source: Institutional Research via Datatel.

Home State	Year (Fall)									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CT	7	5	9	6	11	8	9	9	9	11
FL	0	0	0	0	1	0	0	0	0	0
GA	0	0	0	0	0	0	1	0	0	0
MA	6	5	6	2	4	1	3	4	9	8
ME	1	1	1	1	2	1	0	0	0	0
NC	0	0	0	0	1		1	1	0	0
NH	37	27	35	27	37	34	43	42	43	52
NJ	1	1	0	0	0	0	2	1	1	0
NY	0	0	0	0	2	2	1	1	3	4
RI	3	2	2	1	0	2	1	0	0	0
VA	0	0	1	0	0	0	0	0	0	0
VT	4	3	1	2	3	3	2	3	3	3
WA	0	0	0	0	0	0	0	0	1	0
Grand Total	59	44	55	39	61	51	63	63	69	78

#### OPPORTUNITIES FOR STUDENTS TO PARTICIPATE IN THE PROGRAM

As with all students at KSC, Biology students participate in course evaluations. All professors within the Biology Program give course evaluations at the end of each semester, typically within the last week of classes. These evaluations are used to measure the teaching effectiveness of the faculty in the promotion and tenure process in accordance with the policies outlined in the KSC Employee Association Collective Bargaining Agreement and the Faculty Handbook (both available on the College webpage). Faculty use course evaluations to consider how best to improve their courses with regards to content and delivery. Biology faculty take student evaluations very seriously and routinely discuss them with one another for the purposes of curricular improvement.

In addition to student evaluations of all courses, all students in the BS program participate in the Senior Seminar course within the fall of their senior year. The content of this capstone course varies (and is discussed in section 5 and 8) but always includes a focus on career preparation and the conduct of an assessment exam (discussed in section 10). The results of this exam are considered by the Biology faculty in discussions about what the content of core courses should be, and how the Program can best be modified, thereby providing students a means of impacting program design.

Students participate in a variety of way in the Biology Department's routine and occasional activities. One important means by which students participate in the Department is to assist in the evaluation of candidates for faculty positions in Biology. Students are asked to attend presentations by candidates who have been brought to campus for interviews. Students complete written evaluations of these presentations and these evaluations are then considered when the Department makes decisions regarding the appropriateness of candidates for the positions. Students attend seminars by visiting scientists organized by the Biology Department. Students also participate in appropriate manner in the delivery of courses by working, in some cases, as lab preparators and teaching assistants.

Graduating seniors of KSC all participate in a Senior Survey prepared and administered by Institutional Review. The survey information is sent to students along with the participation form they must complete in order to attend commencement. They are asked to complete the survey in the month prior to commencement. The survey is completed electronically and the results compiled by Institutional Research who posts summaries of these results on the College website. In addition to standardized questions such as “Overall, how satisfied are you with your Keene State College education?” which are completed by selecting from a multiple choice-style menu of options, the Senior Survey sometimes (approximately every other year) asks students open-ended questions that give them the opportunity to say what they would like to see changed at KSC. Student comments are then organized by program and the comments analyzed by Institutional Research. The Keene State College Graduating Senior Survey is available online at <http://www.keene.edu/ir/>. Unfortunately the Biology Department has not traditionally used the information from these surveys in program revision as the information tends to be relatively non-specific and difficult to apply. As discussed previously, we would like the College to help us develop and implement a post-graduation survey to specifically assess the effectiveness of our program in preparing students for post-graduation career activities.

#### *STUDENT CLUBS/ACTIVITIES*

The Biology students organize and run a “Biology Club” which includes both Biology and non-Biology students interested in gathering for social and academic purposes. The major focus of the club is to organize and secure funds for an annual two week trip to a different geographical region of the United States each year. One member of the Biology faculty serves as the faculty advisor for the club each year, and often attends the trip. This trip provides many of our students the opportunity to visit a new area of the US that they would not otherwise have, thereby broadening their educational experience. Other club activities include the organization of talks from visiting scientists from time to time.

In addition to the Biology club there is a chapter of Beta Beta Beta (TriBeta), an academic society for undergraduate biology students aimed at improving the understanding and appreciation of biological study and extending boundaries of human knowledge through scientific research. Entrance to the society is limited to students with a GPA of 3.0. A biology faculty member serves as the advisor for the KSC Tri-Beta group. This group has not been highly active in recent years due primarily to lack of student involvement and motivation, however in the past year the chapter has been “resurrected” and several students have expressed interest in organizing activities in the year to come. Connecting research activities, which are expanding within the Biology Department, to Tri-Beta may serve as a means of facilitating a more vital Tri-Beta organization at KSC, and thereby further enriching the Biology student’s academic environment. For example, students conducting research could present their work at the regional Tri-Beta conference in future.

#### *ALUMNI*

The Biology Program does not have a formal method for maintaining contact with alumni of the Program, nor for evaluating their success upon graduation. However, because our program fosters close mentoring relations with all students in the major, faculty often maintain contact with alumni and are frequently called upon to provide references for students who are applying for career opportunities including graduate school, industry and government positions after graduation. In recent years, we have begun to compile a “Wall of Fame” where copies of letters of admission into graduate programs and offers of employment in the Sciences are posted. While not a formal process, this practice, which was initiated by Dr. Johanna Kolodziejski, represents a method

whereby we are able to “keep track” of at least some of our graduating seniors and measure their immediate career successes.

The anecdotal nature of our contact with alumni is problematic and the Biology faculty would like to have assistance from the College in constructing and implementing a post graduation survey tool to better evaluate the ability of the Biology Program to prepare graduates for their subsequent careers.

## **SECTION 15: RESOURCES: OUR PROGRAM’S EQUIPMENT AND TECHNOLOGY NEEDS AND RESOURCES:**

Science has changed dramatically in the past decade with the advent of new technology and the accompanying information gained through the application of that technology. Accordingly, the standards for excellence in the teaching of science have changed over the last decade. The Biology Department has whole-heartedly embraced these advances in science education and has organized the acquisition of new equipment, its implementation into research and teaching, and the creative integration of laboratory work into almost all of our courses to more effectively teach the practice of science and not simply the theory.

### *PHYSICAL SPACE*

We designed our space in the new Science Center specifically to facilitate our efforts to improve the teaching and learning of biology. The Biology space includes five lecture/lab spaces fully equipped for laboratory and lecture-style teaching including bench space, appropriate and comfortable student seating, sinks, access to chemical fumehoods and biological safety cabinets, gas and appropriate safety infrastructure such as emergency eyewash stations and showers. These teaching spaces include “Smart Cart” technology allowing professors to use powerpoint and other computer technology to best present information. These teaching spaces hold from 16 to 24 students ensuring small class sizes are maintained and maximizing student/professor interaction. One of these spaces (SCIC 351) was designed specifically by the Biology department to support our INBIO 104 classes, integrated lab/lecture courses for nonmajors. Additional physical facilities that are important to the Biology Program include a three shared research spaces, two common prep rooms, a greenhouse and a herbarium. The three shared research spaces support undergraduate research efforts, while the common prep rooms house our chemical inventory, shared storage and equipment, autoclave, fume hood, and dishwasher in support of both teaching and research.

The primary mission of the Keene State College Herbarium is to house correctly identified scientific specimens of the New Hampshire Flora, which includes mainly vascular plants (ferns and their relatives, conifers, and flowering plants). Toward this mission the specimens are maintained in good condition, arranged in an orderly fashion, and accessible to the public. The herbarium is also an important research and teaching facility. The KSC Biology Greenhouse is an 800 square foot Lord and Burnham greenhouse which houses a small teaching collection and provides space for plants for research projects. The plant collection is used for teaching Evolution, Plant Physiology and Ecology, Plant Evolution and other courses. Plants for research projects, chiefly *Passiflora* for an NSF funded research program, are maintained in the greenhouse.

We have lost adjunct office space over the past two years and now have several adjunct faculty housed in a FTTT faculty office that is presently vacated but will be occupied next year. We are also in need of a IACUC-approved facility for housing vertebrates (adult frogs). The increasing use of some of our laboratory classrooms (e.g. SCI 351) for non-laboratory classes offered by other departments has become an issue.

## *EQUIPMENT*

Our teaching spaces contain state of the art equipment and accompanying supportive technology. For example, in 2008 the College provided almost \$250 000 in funding through the Strategic Initiatives program in response to the Biology Department's request for monies to purchase sufficient microscopes and dissecting scopes, and supportive imaging technology (digital cameras and video cameras) to equip every lab. Each of our five teaching spaces is now equipped with enough microscopes and dissecting scopes, all state of the art and of high enough quality for basic research and teaching, for each student in a fully enrolled section to use their own individual equipment. To possess so much high quality imaging technology is rare at any college or university in the nation and is a reflection of the commitment of the Biology Program and the College towards fully implementing a high quality science education program in Biology.

With regards to other equipment the Biology program possesses equipment for analysis of DNA/RNA and protein, chemical analysis, and the maintenance and study of many types of living organisms including microbes, plants, invertebrates and some vertebrates (see below). Our equipment for DNA and RNA-based molecular analysis includes two "standard" polymerase chain reaction (PCR) machines, one quantitative real time PCR, two DNA sequencers, one DNA microarray apparatus, several DNA/RNA/protein gel rigs and supportive UV imaging boxes, and adequate high quality mechanical pipettors to allow students to pursue studies of molecular biology at the lower and upper undergraduate level with ease. Further analytical equipment in the form of a Gas chromatograph – mass spectrometer, high performance liquid chromatograph, atomic absorption spectrometer, standard UV spectrometers and fluorescent microscope are located in either the Biology or Chemistry Department, available to all Biology faculty for integration into their courses and research. In addition to this highly sophisticated and expensive equipment the Biology Program owns several incubators, aquaria, shakers, balances, pH meters and other routine laboratory equipment and are well equipped with standard facilities for preparing chemical solutions, sterilizing equipment and solutions (the autoclave), obtaining high purity water (the Millipore water apparatus), and a full inventory of appropriate glassware for conducting science.

## *TECHNICAL SUPPORT STAFF*

The Biology department is currently staffed by two Lab technicians, one of which (the senior lab technician, Ms. Katie Featherston) is a Professional, Administrative and Technical position at 75% of full time, the other (Ms. Kathy Beltz) is an ancillary position working approximately 35 hours per week during the Academic year. The senior lab technician position is responsible for all purchasing and budget management for the department, set-up and clean-up of all labs, supervising student workers and managing the Biology Greenhouse. The ancillary position is responsible for maintaining the chemical and supply inventory and assisting with lab preparation and clean up.

The Biology Department relies on student assistance for some lab preparatory needs (through work study and the use of students as Teaching Assistants). The growth of hands-on science education in the Biology Program has resulted in increased demands on faculty and staff and the Department envisions the need for the conversion of at least one of these positions to a full time position. Further discussion on the need for support staff availability with regards to information technology is below.

## *ADMINISTRATIVE SUPPORT STAFF*

The Biology department is supported by three administrative support staff, Ms. Marianne O'Brien (administrative assistant to the Dean, full time), and two part time administrative support staff coordinated by Ms. O'Brien. Ms. O'Brien assists the Biology department with scheduling, budgeting and general coordination of countless department activities. All members of the department find Ms. O'Brien to be an indispensable, highly competent staff person that is a tremendous asset to our Department, Program and the School. Unfortunately, the staff supporting Ms. O'Brien are not effective and lack basic skills necessary for administrative assistants, for example, skills such as basic word processing abilities or ability to effectively process time sheets for student workers. These inadequacies are difficult to deal with given that these staff members do not report directly to Marianne O'Brien (instead they report directly to the Dean). We feel this reporting structure should be remedied so that the staff members report to the person in charge of their activities (Ms. O'Brien) which would better enable Ms. O'Brien to ensure that these staff members either gain the skills and other limiting characters required to do their jobs effectively, or be replaced with staff willing to do so. This would improve the overall efficiency of operating not just the Biology program, but all programs in the School.

### *BUDGET*

Typically, the Biology budget allocates approximately \$30 000 per year to support direct laboratory costs for courses, to maintain the greenhouse and herbarium, to conduct independent study coursework with students and to maintain the general supplies necessary for a lab-dense Program (such as safety supplies and routine chemicals). This is allocated to specific courses at the beginning of the year. In addition, approximately \$12 000 per year is allocated for equipment purchase and \$2000 per year for equipment maintenance. Other monies are allocated for printing, telecommunication costs and minor routine costs associated with running the Program.

In recent years the Biology Department has had to solicit increased money for course supplies. For example, in both 2007/2008 and 2008/2009 the budget originally consisted of approximately \$20 000 for course supplies and it was necessary to obtain an additional amount of approximately \$10 000 each year. There are several reasons for this increased monetary demand. Firstly, supply costs have increased significantly in the past three years, particularly the costs of shipping, plastics and any other disposable product that relies on the petrochemical industry. Secondly, the availability of better space and physical equipment, and the subsequent re-design of courses to improve the quality and quantity of hands-on science education, has resulted in the use of more supplies. We consider this the cost of running a high quality program and are committed to continuing to pursue an expanded course budget so that we can better educate students and fully utilize our state of the art facility and equipment. While the purchase of the imaging technology described above has relieved us of the necessity of dedicating most of the \$12 000 in equipment money to the purchase of new microscopes and dissecting scopes, that money is still inadequate to replace equipment that needs to be retired such as older incubators that have a relatively short lifespan and are heavily used, glassware which needs continual replenishment, and smaller equipment such as manual pipettors which students, as part of the normal learning process, wear out quickly. The Department would also like money to pay for field trips for students and for additional funding for equipment maintenance and continued education/training for faculty on some of the newer, state of the art equipment.

### *SUPPORTING PROGRAMS AND OTHER COLLEGE SERVICES*

#### *Informational Technology*

The Information Technology Group at KSC provides a wide range of technology service and support used in the implementation of the Biology Program. The IT Group is responsible for our technology infrastructure which includes telecommunications services and network support. Two particularly vital functions IT performs are the maintenance of Blackboard and the Help Desk. The Biology Program relies on the use of Blackboard in all its courses; all faculty in Biology disseminate information via Blackboard and use it as a powerful course management tool.

The HelpDesk provides assistance with computing, network, hardware, software, and telecommunications problems and questions. This group is probably one of the most critical groups for supporting the Biology Program (and all Programs at KSC) as we rely heavily on them to maintain faculty computers, networking and to assist with the use of information technology in the classroom. No other service on campus (with the exception of Environmental Health and Safety) is called upon to assist with “classroom emergencies” that directly impact the student experience (such as the inability to project a powerpoint slide show to augment a lecture, or to project images from the microscope for classroom discussion). The Biology Department has noticed that while the numbers of student, faculty and administrators have grown in the last few years, there is no accompanying growth of staff available at the Help Desk. If this trend continues we envision a reduction in a vital service which will adversely affect our ability to run our Program.

A problem related to IT that impacts the Biology Program is the blending of computers associated with existing laboratory equipment into the IT network. Typically, when scientific equipment is purchased, it comes with a computer that has the appropriate software on it. This computer is not ordered/installed through IT, and thus is not subject to maintenance or networking by our IT staff. This is problematic. For example, this has posed a problem for the implementation is in the use of a very sophisticated UV-Vis Spectrophotometer in Biology. This equipment is associated with an older computer that arrived when the equipment was purchased and is not supported by IT, and thus not networked. Because we cannot get the computer networked students and faculty cannot print or transfer electronic files from the equipment for analysis and presentation. This renders this excellent piece of equipment almost unusable in a modern educational environment. Increased flexibility and support with regards to our information technology needs are required to work around these issues and implement our Program to its full potential.

### *Environmental Health and Safety*

The Keene State College Office of Environmental Health and Safety (EHS) assists us with the work of providing a safe and healthy working environment for students, staff and faculty of the Biology Program. EHS is responsible for hazardous materials and environmental management; occupational health; general safety; illness and injury prevention; industrial hygiene; and other technical areas, as outlined in the USNH Policy on Environmental Health & Safety and describes at: <http://www.keene.edu/ehs/>. EHS, with the help of a committee of faculty and staff in the Natural Sciences compiled a “Chemical and Biological Safety Procedures for the School of Sciences and Social Sciences” (online at the link above) which details procedures for hazardous waste spills and disposal, correct use of safety equipment such as chemical fumehoods, and requirements for training of students in the laboratory. This is a vital service to the Biology Program implemented in 2008/2009.

Importantly, as indicated in the “procedures” we are required by law to have a Chemical Hygiene Officer, a position that is currently unfilled. As our EHS group consists of only one individual who is responsible for EHS campus-wide, the lack of a Chemical Hygiene Officer compromises our ability to maintain a safe environment

for students, staff and faculty and thereby compromises the Biology Program. We hope that the College will work to create this vital position as they continue to support the sciences.

#### *Institutional Animal Care and Use Committee (IACUC)*

The Institutional Animal Care and Use Committee (IACUC) is a self-regulating entity that, according to U.S. federal law, must be established by institutions that use laboratory animals for research or instructional purposes to oversee and evaluate all aspects of the institution's animal care and use program. Keene State College is such an institute as the Biology Program conducts research with amphibians. Currently, we do not have a federally approved IACUC although we have a nascent IACUC committee that includes two Biology faculty members and the Director of the Office of Sponsored Projects. In order to conduct research, and to apply for Federal grants, we are now in the position where we have to rely on nearby institutions (USNH and more currently Dartmouth College) to provide their IACUC to oversee our use of animals. This situation is inefficient and unethical in that we are not properly modeling the appropriate compliance with Federal requirements by failing to develop a viable Federally approved IACUC here at KSC. This process must be driven by the College leaders. The Biology Department hopes that the appropriate College leadership will increase its efforts to support the development of a viable IACUC here at KSC as the lack of one is currently hindering the Biology Program's ability to secure federal funding, conduct research and implement more use of amphibians in our curriculum.

#### *Mason Library*

The Mason Library provides resources and instruction in support of the Biology Program. The library holdings number about 326,000 items and annual publications; subscriptions to more than 900 print periodicals and newspapers and an extensive selection of videos, DVDs, audio books, and music CDs. The Cohen Center for Holocaust Studies, Curriculum Materials Library and Orang Asli Archives as well as other collections are located in the library. One of the most important resources used by the Biology Program are the online databases such as Biological Abstracts, Agricola, and the Web of Knowledge which tabulate scientific information published in peer reviewed journals, typically the library resource of most importance in science education. Off-campus access to these services is provided to patrons with a library-validated KSC student or faculty ID. While the library subscribes to relatively few journals in the sciences as compared to a larger institution, access to a much larger collection is available through the services of interlibrary loan. All Biology faculty agree that the lack of online access to Nature, Science and the Proceedings of the National Academy of Sciences (the three preeminent journals in science) are significant limiters to the ability of the Biology Program to support high quality science education. Biology faculty also find that while interlibrary loan is generally effective and the staff are highly qualified and supportive, the quality of the article received is often so poor as to render it unhelpful. Given the relatively remote location of Keene State College these are significant concerns.

#### *Office of Sponsored Projects and Research*

The mission of the OSPR is to provide high quality support for faculty and staff interested in seeking grant funding for research, training, service and other projects. This includes assistance in all phases of pre-award grant activity: identifying funding opportunities, proposal development and submission, and negotiation/acceptance of awards. Working closely with the Business Office, OSPR also provides assistance and support for post-award issues. The Director, Dr. Penny Miceli, has been instrumental in facilitating recent



grant efforts in the Department. Dr. Miceli is a Certified Research Administrator (CRA), a distinction bestowed by the Research Administrators Certification Council, after candidates meet their minimum requirements in terms of experience in the field of research administration, and then by mastering the “body of knowledge” and passing a standardized exam. Re-certification is then required every 5 years. We are fortunate to have such a highly qualified Director at OSPR and look forward to working with Dr. Miceli in furthering our ability to obtain external grants to support our Program.

### *Center for Writing*

The Center for Writing, provides support for students and faculty to promote effective writing and thinking by offering a variety of services. These services include peer tutoring for students, and The Calderwood Institute on the Teaching of Writing for faculty. This Institute immerses participants in current research on composition studies, cognitive developmental theory, and the relationship between thinking, writing, and learning with the goal of supporting faculty to be better teachers of writing. Two of the Biology faculty have participated in the Calderwood Institute and both of those faculty have translated their experience into the implementation of ITW (Thinking and Writing) courses for the College ISP program.

### *Math Center*

The Math Center administers math competency tests and quizzes for faculty members, as well as proficiency and assessment testing for individual courses. Although none of the Biology courses directly require such assistance, the students participating in the Biology BA and BS are required to take chemistry and physics courses which require proficiency in mathematics and for these courses the responsible faculty rely on the math center for assessment and tutoring of students. Students weak in mathematics are able to obtain tutoring at the Math center. In addition, the Math center provides review sessions for the Praxis exams that are a component of the Education program. Anecdotal reports from Biology students indicate that the Math center provides excellent support of our students although we have not systematically collected data to verify this statement.

### *Aspire*

The Aspire program is a federally funded program which provides students with academic support services designed to enhance success. This program is available to students who are 1) first generation College students, 2) some low-income students receiving financial aid and 3) students who have a documented learning and/or physical disability. Aspire will encourage students to take full advantage of the services available at Keene State. They also assist students in examining their strengths and limitations in order to create a realistic schedule of classes. The program attempts to help students improve their performance in classes, and increase the likelihood that students will graduate. Aspire offers individualized peer tutoring, study skills workshops, study skills handouts, academic advising, financial aid advising, one on one educational counseling, and access to a small computer lab and other support services. As some of the students enrolled in the Biology degree programs, and students taking Biology courses generally speaking, require these services, the Biology Program relies on the work of ASPIRE to successfully operate. All biology course syllabi typically include text describing the ASPIRE program and Biology faculty work to help direct students in need of the services of ASPIRE to that office in a timely fashion. Biology faculty also work with ASPIRE when students with identified learning or physical disabilities require extra support, for example, when a student requires the provision of a separate space and extended time for the conduct of examinations Biology faculty will typically enlist the support and services of ASPIRE.

### *Continuing Education*

The Continuing Education office coordinates access of non-matriculated students to KSC courses, managing enrollment and tuition, and coordinating the access of these students to KSC facilities and services. Although most students in the Biology BA and BS degree programs are matriculated students (see Section 14 for a description of students enrolled in the Biology degree programs) from time to time students enrolled in our classes, both those for majors and non-majors are enrolled through the Continuing Education program.

### *Academic and Career Advising*

It is the mission of the Academic and Career Advising department (ACA) to support students in the transition to Keene State College, in the clarification of academic focus and major, and in the successful translation of their academic credentials as preparation for life after the college experience. ACA works with the Biology Program to ensure that students are receiving appropriate advising in their academic programs (see Section 11), and that students have access to support services for career preparation. While the Biology Program performs its own one-on-one academic advising for all majors and any minor students who request it, questions regarding how transfer credits apply to degree requirements, how military experience may translate to credit and other areas are typically answered by the collaboration of ACA and Biology faculty on a case by case basis. Biology faculty also work closely with ACA to ensure that incoming freshman students receive appropriate information regarding the first semester's coursework and thus do not get "behind" in their pursuit of a Biology degree which requires a sequential approach (see section 5).

### *International Education*

The National and International Exchange Office provides support to students studying away as well as to international students studying here at Keene State College. The Office coordinates the "study away" program, granting admission to the program, coordinating tuitions and fees, and helping to ensure that students earn credit relevant to their degree requirements while participating in the program. In order to accomplish this for Biology majors, the Office typically works with the student involved, and their Biology faculty advisor to compare appropriate courses at the selected institution away with the Biology curriculum. This is conducted on a case by case personalized basis.

### *The Center for Engagement, Learning and Teaching (CELT)*

The Center for Engagement, Learning and Teaching is a newly created center aimed at providing resources and experience to support deeper learning, effective teaching, and community and professional engagement at Keene State College. Functions CELT will now be coordinating include academic technology, new faculty orientation and hosting/organizing Teaching Excellence Week in the spring of each year. CELT is also the center coordinating service learning on campus and will be instrumental in re-designing the service learning program. We look forward to working with CELT in the future.

## **SECTION 16: SUMMARY OF STRENGTHS OF THE PROGRAM**

The strengths of the Biology program essentially remain unchanged from those stated in the most recent program review. In that review, the faculty were identified as the primary strength of the program because they are well-qualified, devoted to teaching, and maintain collegial working relations with each other. We have built on this strength and continue to hire excellent faculty. The new curriculum (at the time), which uses a more

developmental approach by adding in sophomore core courses and also incorporates a greater variety of pedagogies, was also cited as a strength. Our curriculum has been improved further through the innovative integration of laboratory and lecture experiences and maintenance of small class sizes. Throughout these curricular revisions, the Biology faculty have remained committed to offering a diversity of courses so that our students graduate with a broad exposure to the field. Our facilities and equipment have improved significantly since the last review and better support our programs and pedagogy.

## **SECTION 17: SUMMARY OF CHALLENGES FACING THE PROGRAM**

Despite the significant improvements in facilities and equipment since the last review, one of the primary challenges facing the program remains unchanged. Ten years ago, the executive summary program review stated that “concerns were raised by all three levels of review about the departments [sic] reliance on adjuncts and heavy work expectations for faculty, which impede the faculty’s ability to be engaged in more traditional forms of academic scholarship.” There are serious deficits in the level of institutional support for real scientific research and the provision of research experiences for undergraduates in biology.

The following issues need to be addressed:

- 1) Research with undergraduates is an uncompensated add-on to already burdensome teaching loads. Faculty need to be compensated for their efforts with release time and/or money. As an illustration of this point, the Dean of the School of Science and Social Science was recently awarded a strategic initiative which would pay incoming freshmen to engage in research with faculty. The students are provided with a significant stipend and some supply money was made available; however, despite repeated requests for compensation for the faculty, who have to train these novices and ensure their safety, none was provided. (The letter that was sent to the Dean regarding these issues is included in the appendices – Appendix 9.)
- 2) Research with undergraduates needs to be recognized and identified so that it better “fits” the traditional categories of teaching, service, and scholarship. Is it teaching? Is it service? Is it scholarship? Is it service learning? Is it an internship? Is it cooperative education? A case could be made for fitting research with undergraduates into any or all of these categories. Because it isn’t formally classified by the College, one of the most time-consuming and significant of faculty activities goes unrecognized and uncompensated.
- 3) We are grateful for our two excellent part-time technical staff; however, we have no technical support for teaching and research efforts in the summer. The part-time status of the two technicians means that they are only available to provide support for teaching, not research, efforts.
- 4) There is no technical support for equipment maintenance. In addition, Instructional Technology does not provide support for computers associated with laboratory equipment (even though they are used for teaching).
- 5) There is no supply money for research efforts. The Undergraduate Research Grant program can supply some money, but the limit of \$750 is insufficient for many types of projects and there is a significant lag time in getting funding for projects.

- 6) Some important infrastructural needs remain unmet. For example, there is no approved IACUC which precludes the ability of obtaining federal grants. There is no chemical hygiene officer on campus which means we are not compliant with OSHA regulations. The lack of a poster printer has made preparation for conferences onerous.
- 7) There is no compensation for grant-writing activities. The College wants science faculty to write grants but does not compensate for the time. The lack of supporting infrastructure for research with undergraduates makes *finding* the time to write grants almost impossible.

Another important challenge is the recent loss of a one-half position to the Environmental Studies Program. The loss of this position, along with other recent events, has greatly increased our reliance on adjunct faculty. While we have been able to hire well-qualified adjuncts, they do not contribute to the considerable service load of the Department, nor do they offer research experiences for undergraduates. The ultimate result is an ever-increasing burden on the remaining FTTT faculty,

Other challenges to the program include the continued level funding of our operating budget. Because we cannot afford many of the supplies we need, e.g. kits that increase efficiency, we spend more time than necessary preparing for lab activities. The need for frugality and the work that goes into finding cheaper, alternatives adds greatly to our workload. Our budget needs to increase annually to cover inflation, the increased shipping costs and expense of petroleum-based supplies, to expand the number of hands-on lab experiences we offer, to allow for more field-based experiences, and to integrate more lab experiences into our ISP offerings.

The lack of a departmental website and ability to communicate what we do remains a challenge for our department. The faculty have attempted to construct a website, but no one has the time or expertise to bring the project to completion. The College should develop a website for the Department to aid with student and faculty recruitment, to advertise our accomplishments, and to maintain valuable connections with our alumni. The College should develop a protocol for how we can communicate to the College and the outside world, the accomplishments of our students and faculty.

The Biology Department openly admits that it is unhappy with its current assessment plan and needs help with developing an alternative.

## **SECTION 18: PROGRAMMATIC ACTION PLAN**

The Biology Department plans to work diligently over the next couple of years to address the challenges listed above. We plan to:

- 1) Identify and implement a mechanism for compensating faculty for the research experiences they provide to undergraduates. One possibility includes the development of an independent study-like course, called "Research Experiences in Biology". Once a faculty member has offered 5 of these 4-credit research experiences, they would be eligible for a course release or monetary compensation for 4-credits of overload pay.
- 2) The Department will work with the new Coordinator for Experiential Learning, The Director of the Office of Sponsored Projects and Research (OSPR), the Dean, and the Provost to advocate for the support we need (technical, administrative, monetary) to facilitate year-round research activity.

- 3) We will also work with OSPR to identify ways to compensate faculty for their grant-writing efforts. Many grants provide significant indirect funds to the College and the faculty that bring funding to the campus could be compensated.
- 4) The Department will advocate for a new FTTT position in Biology to replace the half position lost to Environmental Studies to decrease our heavy reliance on adjuncts and relieve some of our workload burden.
- 5) The Department will lobby for an operating budget that better supports its teaching efforts and the need for new equipment.
- 6) The Department will work with the College to improve its visibility and to communicate its activities to the campus and beyond.



# Academic Program Review

## Self-Study for the Biology Department

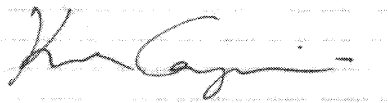
2009

Department Chair: Karen Cangialosi

Authors: Susan Whittemore and Loren Launen

- ❖ Biology Bachelor of Arts
- ❖ Biology Bachelor of Science
- ❖ Biology Minor

X



Karen Cangialosi, Biology Department Chair

X

Gordon Leversee, Dean of Sciences and Social...

X

Date Submitted

X

Date Completed

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## SECTION 1: HISTORY OF THE PROGRAM:

### *OVERVIEW AND CURRICULAR DEVELOPMENTS*

As appropriate for a college founded as a normal school, our current Biology curriculum grew out of an 18-credit secondary education Science certification option in the B.Ed. program of Keene Teachers College. In 1947, the federal government relocated a radar classroom from a Rhode Island airbase to a site next to Huntress Hall at Keene Teachers College, where it served for two decades as teaching and lab space for the Science Department. That department offered a single two-semester "Biological Science Survey" course to students earning the 18-credit Secondary Science certification option in the Bachelor of Education program. In 1963, the institution was renamed Keene State College and assumed a broader liberal arts mission. By AY 1964/65, secondary education students could elect a 36-credit Biology "major concentration". In the following year, the Biology program more officially commenced when the College established a Bachelor of Arts (122 credit) and a Bachelor of Science (128 credit) degree, each with a Biology major. Biology was thus the first natural science to sponsor discipline-specific non-education baccalaureate degrees at KSC. In AY 1972/73 the Chemistry/Biology and Chemistry/Physics majors were added to the Biology and General Science majors available to B.Ed. and B.S. students. The Chem/Bio major was removed from the catalog in the early 1980s at the same general time that the Biology Minor program was officially entered into the catalog.

Initially, the 36-credit Biology B.A., which included two years of chemistry and one of physics, was the primary life science degree for students not pursuing teaching certification, while the first Biology B.S. served only a handful of students and was offered as an individualized major without prescribed Biology coursework. In the 1970's the B.A. and B.S. in Biology became increasingly rigorous with the addition of prescribed courses and increased credit number requirements. This suited both increased secondary education standards supported by the Biology Program and a focus on preparing students for professional training in medicine, dentistry, veterinary medicine, optometry, or forestry and wildlife management (referred to in the catalogs of this decade). It should be noted that preparation for academic graduate programs was not prominently mentioned in the B.A. or B.S. descriptions at the time although it was included in catalogs published during the 1980s. By 1980 the Biology B.S. (still 36 credits) included coursework in General Botany and Zoology; Genetics; Cell Biology; Ecology or Evolution; and plant- or animal-based courses in Taxonomy/Field Biology, Morphology/Development, and Physiology. By 1980 the credit requirements for the B.S. program increased from 36 to 44.

During the 1980s there were many relatively small changes in the courses offered in Biology and in the number of prescribed versus elective credits. By the 1990s the basic composition of the B.A. and B.S. programs were as follows: the B.A. included 36 Biology credits derived from "core" requirements at the 200, 300 and 400- level. All students in the B.A. took one year of 200-level courses in basic Biology, followed by Genetics, Evolution and Experimental Ecology at the 300 and 400-level. They then completed their Biology courses choosing from a diverse array of 300 and 400-level classes which allowed students to study specific disciplines within Biology such as Invertebrate Biology or Animal Behavior. The B.A. also required one year of General Chemistry. The B.S. program required 44 credits of Biology with a similar composition as the B.A. The Chemistry requirements for the B.S. included one year of General Chemistry and one year of Organic Chemistry followed by one semester worth of chemistry from a specific menu at the 300-level. All students in the B.S. were required to take one year of physics, as well as a statistics and calculus course.

Although there were some changes in the courses offered in Biology during the 1990s, reflecting changes in the disciplines of Biology and the faculty expertise, there were no major program revisions in any of the Biology program curriculum until the following decade in which two major program revisions occurred.

In AY 00/01 the Biology B.A. and B.S. programs were substantially revised to reflect the incorporation of a more developmental student-centered approach. In this revision the basic Biology courses entitled “Life Diversity” and “Life Processes”, which were previously offered at the 200-level as the sole Biology prerequisites to all 300 and 400-level courses, were converted to 100-level science major specific courses and a sophomore core requirement was implemented that included Genetics, Ecology and Evolution, Physiology of Plants and Animals (or Human Anatomy and Physiology) and Cell Biology, with some required lab components. Only upon completing this sophomore core could Biology students proceed to take courses at the upper level from a menu of offerings representative of disciplines within Biology. This developmental approach was incorporated into both the B.A. and B.S. programs.

The B.S. program Biology core also incorporated a Biology Seminar intended as a capstone experience for students preparing to graduate. For both the B.A. and the B.S. there were some changes in the related science and math courses required. For example, for the B.A. program, Physical Geology could serve as a substitute for Physics, and in the B.S. program, Biochemistry (lab and lecture) became required. In this program the lab components associated with the upper level requirements were also rendered more specific to ensure students received sufficient preparation in experimental methods. In this version of the program the B.A. continued to require 36 Biology credits while the B.S. required 56 credits. At this same time the Biology Minor also implemented this developmental approach wherein students conducting a Minor in Biology had to complete the same freshman and sophomore core courses as those pursuing majors in Biology, but then only took 8 credits at the upper level. (In the earlier version of the program students completed 11 credits of sophomore core courses, one 300 level Evolution course and 13 additional credits at the upper level).

In AY 07/08 the Biology B.A. and B.S. programs were again substantially revised. At this time the College underwent a College-wide transition from a 3-credit to a 4-credit model. The Biology Department embraced this transition and used this opportunity to institute an integrated lab and lecture model into its programs. Almost all Biology courses include lab components and are now taught in lab classrooms where faculty and students can move between theoretical lecture-based learning to hands-on laboratory based learning. Some changes in the core courses also occurred. The first year course “Life Diversity” was remodeled into a course entitled “Evolution” to increase the focus on learning all Biology within the context of evolution as is appropriate for all modern Biology programs. The first year course “Life Processes” was altered to become “Cells and Molecules”. The sophomore courses were reduced to three: Genetics, Cells and Physiology and Ecology, each with an integrated lab component. Some changes in the upper level courses were also implemented where various types of Biology courses were organized into four categories (Molecular/Physiology, Plant/Microbiology, Animal Diversity and Ecology/Evolution) and students were required to take courses from each category, ensuring that students take a diverse array of courses representative of many disciplines within Biology before graduation. These changes were applied to both the B.A. and the B.S. program. As in the previous version of the program, all students are required to take an upper level Biology Seminar intended as a capstone experience for graduating students. Changes in the related science and math courses included the removal of the Calculus and Biochemistry requirement from the B.S. program. The number of Biology credits remained the same as in the AY 00/01 program for both the B.A. and B.S.

Despite the significant College-wide and Biology-specific changes that have occurred in the past several years, the Biology Program has continued its tradition of pedagogical excellence, expanded its commitment to integrating laboratory work into all science classes including some offered for non-majors, and increased the number of opportunities for students to conduct undergraduate research in Biology. We have also maintained our strong commitment to General Education through service to the new College Integrated Studies Program, discussed in Section 6.

#### *STUDENTS SERVED*

The Biology Programs serve students who major in Biology, Chemistry, Environmental Studies, Health Sciences, Education and General Science, as well as fulfilling an important role in providing courses for the Integrative Studies Program required of all KSC students. The specific courses and their enrollment patterns are discussed in Sections 7 and 8. At the time of the last Program review (1999) all of these majors were in existence and Biology was already providing courses to support each of these types of majors. Changes in the past 10 years in *how* Biology serves students are due primarily to the recent increase in the numbers of students served and the implementation of both a new Biology Program and a new Integrative Studies Program. Enrollment at KSC has increased from 3995 Full Time Equivalent (FTE) students (Fall 1999) to 4979.8 FTE (Fall 2008). This increased enrollment has resulted in a greater demand on all programs including Biology. The number of majors in Biology has grown from 14 (BA) and 26 (BS) in 1999 to 16 (BA) and 56 (BS) in 2009 (Table 8.1). The increased number of students has resulted in a requirement for more sections of non-majors courses and courses offered for other Programs (see sections 6 and 7 of this report). Furthermore, the implementation of the new Biology Program and the new ISP Program have resulted in a significant redesign of courses.

#### *FACULTY*

At the time of the last program review (1999) the Biology Department consisted of 6.5 full time tenure track faculty, with one member of the Department assigned ½ time to Biology and the other ½ time to Environmental Studies (Dr. Renate Gebauer). Since that time five Biology faculty were hired (Zhjera, Zerucha, Porter-Utley, Launen and Kolodziejewski) and 4.5 have departed due to retirement, resignation, death, and reassignment (Wise, Zhjera, Zerucha, Kolodziejewski and Gebauer). Currently the Biology Department possesses 7 full time tenure track faculty. Section 12 describes this faculty turnover in more detail. In addition, the Biology Department employs one contract lecturer (Jarry) and one Professional and Administrative position (Smith), several adjuncts including one full-time adjunct (Piscopo) and two part time laboratory and greenhouse technical support staff (Featherston and Beltz). Turnover in these laboratory preparatory positions is also discussed in Section 12.

#### *NOTEWORTHY CHANGES*

The Biology department relocated from the first Keene State College Science Center (the “Science and Arts Building”) constructed in 1967 to the current, state of the art Science Center in 2004. The Science Center is equipped with 32 labs for teaching and research, all designed with Science faculty input, and houses millions of dollars worth of high-tech equipment including a DNA sequencer, DNA microarray equipment, gas chromatograph-mass spectrometer and fluorescence microscope, to name a few key pieces. In 2008 the College supported the Biology Department’s internal grant application (the Strategic Initiatives process) and awarded us \$1.8 million to purchase new microscopes, dissecting scopes and accompanying imaging technology. Very few

other undergraduate colleges in the region, or the nation, offer the research and study opportunities now available to Keene State College students in Biology (or the other natural sciences).

In addition to implementing the novel integrated lab/lecture model in our curriculum, the improved physical space and research equipment has resulted in an increased level of research occurring within the Biology Department. This has created opportunities for more students to participate in undergraduate research opportunities and facilitated obtaining grants. The Biology program is committed to the integration of research with teaching by offering undergraduate research experiences to deserving majors. The expansion in the amount and scope of research conducted with students in the Biology program has lead to increased participation of Biology students in local, national and international conferences where KSC Biology students are presenting their own undergraduate research. For example, in the AY 2008/2009 alone 8 KSC Biology students presented at the Northeast Undergraduate Research Conference in Maine, and four have attended international conferences in Biology disciplines to present their research. This has resulted in greater recognition for the Biology program at KSC regionally and nationally and expanded opportunities for students including expanded and immediately marketable job skills and improved candidacy for graduate programs. We expect this trend to continue growing as more research programs become better established in the Biology Department as we are now more competitive in our applications for research funding to support student endeavors. The downside of what should be seen as a welcome development, is that faculty workloads have increased to almost unsustainable levels because research experiences with undergraduates is not well-supported and completely uncompensated (see section 16).

## **SECTION 2: RESULTS OF LAST PROGRAM REVIEW**

The previous program reviews, by the Vice President for Academic Affairs (Robert Golden) and the Senate Academic Overview Committee, were conducted from August 1999 to April 2000. These reviews are mentioned in the VPAA's executive summary of that Program Review in the appendices of this self-study. Two external reviewers from the University of Maine at Farmington and Colby College contributed to the reports.

In the previous reviews, the strengths of the Biology program were identified as the faculty, which were described as well-qualified, devoted to teaching, and collegial, and the curriculum, which was described as developmental in design and focused on student-learning. The primary weaknesses of the program were identified as the severe inadequacies of the facilities, equipment, and supply budgets; the heavy work expectations for the faculty; and the overall lack of support for traditional forms of scientific scholarship. It is important to note that virtually all of the weaknesses identified in those reports could be defined as lack of institutional support for the program and its faculty and that few, if any, of the issues could be remedied by the faculty alone.

Ten years later, Biology faculty remain collegial and committed to working collaboratively and creatively to improve our curriculum and to contribute significantly to the Integrative Studies Program and to the liberal arts mission of the College. While we are currently understaffed due to the death of a young, new faculty member and the loss of a half-time position to the new Environmental Studies Program, we anticipate that we will continue to identify and hire excellent faculty that are a good fit for our mission.

Since the last program review, many, but not all, of the weaknesses listed above have been addressed. The Biology Department is now in the new Science Center and has well-designed classrooms and teaching laboratory spaces to support its new four-credit curriculum. The Department also has three shared research

spaces to support faculty and undergraduate research efforts. We have purchased new equipment for teaching and research with College funds and with grants from the National Science Foundation. The recent hire of Penny Micele to direct the Office of Sponsored Research has greatly facilitated grant-writing efforts at KSC. The Department was awarded a Strategic Initiative Grant in 2008 which allowed for the replacement and expansion of our entire microscope inventory. Our supply budget to support our courses has increased and, while still inadequate for some of our courses, has increased significantly since the last review.

However, there are some very important challenges that remain unsolved. Faculty workload is even heavier than ever as faculty attempt to write grants, develop their research projects and spaces to their full potential, and contribute to the ever expanding service work required by the College. The previous report stated that the outside reviewers were very concerned that “the strong synergy between research and teaching is not facilitated very well by KSC administrative support.” While we now have some of the facilities we need to support research with undergraduates, the lack of time, financial support, and ongoing technical support makes it difficult to sustain a viable research effort. Although providing research experiences for our majors is likely one of the most critical learning experiences we offer, we have yet to find a way to do this work and receive any form of compensation (time or money). While the College receives tuition for independent study credits, research with undergraduates remains an uncompensated, complete add-on to our current demanding teaching loads. In addition, there is no incentive for faculty who are fully promoted to continue their research efforts.

### SECTION 3: PROGRAM GOALS

As stated in the Keene State College catalog, the programmatic goals for Biology are as follows:

***1) Biology majors will be able to demonstrate understanding in the following fundamental areas of the biological sciences:***

***Biological Diversity:*** Biological diversity is the diversity of subspecies, species, and higher level taxa or clades, the phylogenetic relationships of those taxa, and the features that distinguish specific lineages or taxa. This concept does not include genetic or phenotypic diversity of individuals within a species.

***Evolution:*** Evolution consists of change in the hereditary characteristics of groups of organisms over the course of generations. It encompasses several subdisciplines: behavioral evolution, evolutionary developmental biology, evolutionary ecology, evolutionary genetics, evolutionary systematics, paleontology, and molecular evolution.

***Sub-organismal Biology:*** Sub-organismal refers to the structure, function, and evolution of the components of individual organisms, from the molecular level to tissue and /or organ-system level. This includes, but is not limited to, biochemistry and metabolism, proteomics, genetics, molecular and cell biology, neurobiology, and physiology.

***Organismal Biology:*** The term organismal refers to individual organisms and their structures and processes, such as reproduction, development, life cycle events, ecophysiology, behavior, feeding, locomotion, dispersal, and mortality. Whether applied to single-celled microorganisms or to complex multicellular organisms, 'organismal' denotes specific modes of survival and reproduction and refers to the target or object of natural selection.

**Supra-Organismal Biology:** Supra-organismal refers to populations, communities, ecosystems and other higher levels of biological organization such as landscape, biome or biosphere. It includes focus on patterns of diversity, community succession, species interactions, behavioral ecology, population dynamics, trophic structure, nutrient cycling, and energy flow.

- 2) *Biology majors will be able to develop testable hypotheses, design experiments to test hypotheses, and conduct experiments including data collection, analysis, interpretation and presentation. They will also be able to effectively search computer databases for relevant literature (primary and secondary) on scientific topics.*
- 3) *Biology majors will demonstrate critical thinking and communication skills, both oral and written, for the purposes of conveying biological information to professional scientists and the lay public.*
- 4) *Biology majors will develop intellectual independence, scientific literacy, and an appreciation for the connections between biological science and society.*

Upon graduation, the majority of our majors enter the workforce. Many will later apply to graduate programs after working in biotechnical or pharmaceutical fields or in natural resource research or management fields for typically one to five years. A significant number of students enter graduate programs in the biological sciences or professional programs (e.g. medicine and pharmacy) immediately upon graduation. The Biology Department offers three programs: the B.S. in Biology, the B.A. in Biology and the Biology minor (see Design of Programs) to meet the diverse needs of our majors. Students preparing for technical employment or post baccalaureate study in graduate school, or professions such as medicine, dentistry, veterinary medicine, teaching, and natural resource management are encouraged, in most cases, to pursue the B.S. in Biology. However, some of our students are advised to pursue the B.A. in Biology so they can leave room in their schedule to also obtain a B.A. or minor in Chemistry or another major or to meet special course requirements for certain post-graduate programs (e.g. Pharmacy) that do not count toward their Biology major (e.g. Human Anatomy and Physiology, Kinesiology, Psychology, etc.). Those that take the B.A. are often encouraged to complete a "B.A. Plus" where they take additional courses commonly required by graduate or professional programs like Organic Chemistry and a full year of Physics. The Biology minor is designed to permit students majoring in another field to pursue a program of study in the life sciences.

The Biology Department constantly assesses its programmatic objectives to ensure they meet workforce needs, as many of our students work in the biotechnology industries, and post-graduate program requirements (medical, dental, and pharmacy programs and M.S. and PhD programs in many areas). We also work closely with the Secondary Education program (specifically Dr. Sally Jean) to ensure we are meeting the course requirements of students who intend to obtain certification to teach high school-level biology. Biology is very interdisciplinary in nature with many sub-disciplines; therefore, there is no single professional organization to consult regarding our programmatic offerings.

## SECTION 4: RELATION OF THE PROGRAM TO THE MISSION OF THE COLLEGE

### *COLLEGE MISSION & VALUES*

Keene State College prepares promising students to think critically and creatively, to engage in active citizenship, and to pursue meaningful work. As the public liberal arts college of New Hampshire, we offer an enriching campus community and achieve academic excellence through the integration of teaching, learning, scholarship, and service.

Our liberal arts mission dedicates us to the development of knowledge and skills necessary to meet the challenges of our changing world. As a public institution, we provide educational opportunities for all qualified students and continue our heritage of service to New Hampshire and the New England region.

We value:

- all members of our community: students, faculty, staff, alumni, and friends.
- strong relationships among students, faculty, and staff.
- excellence in teaching, learning, and scholarship.
- commitment to learning and cultural enrichment.
- social justice and equity in our community and in our curriculum.
- educational challenge and support for a wide range of learners.
- physical and financial access and support.
- balanced development of mind, body, and character.
- diversity, civility, and respect.
- civic engagement and service to the community.
- environmental stewardship and sustainability.
- partnerships that enhance the quality of life in the Monadnock region, New Hampshire, and the world.
- an attractive campus that inspires and supports inquiry, reflection, and social interaction.

### *MISSION OF THE BIOLOGY DEPARTMENT*

Our goal is to foster an understanding of biology not as a compilation of unchanging facts but as a way of thinking, always subject to revision based on new insights and observations. Our programs teach students the scientific method, a mode of inquiry involving rational observation, experimentation and critical analysis. Through our programs students will develop an understanding of all forms of life, their evolutionary histories and relationships, and their interactions at levels of integration ranging from molecular to biospheric. We prepare students for graduate programs in biology and for a broad range of biology-related careers including those in the fields of biotechnology, environment, medicine and teaching. Our department supports the Keene State College liberal arts mission through the cultivation of an appreciation of natural science and its relevance in society for all Keene State College students including non-Biology majors.

## *THE BIOLOGY DEPARTMENT'S MISSION AS CAPTURED IN THE DESCRIPTIONS OF ITS PROGRAMS:*

The Bachelor of Science program in Biology is designed to stimulate intellectual and personal growth through an examination of the fundamental properties of living systems, the application of experimental and descriptive methods of discovery, and the consideration of the social, ethical, and aesthetic aspects of biological knowledge. The B.S. program also provides undergraduate preparation for technical employment or post baccalaureate study in graduate school, or professions such as medicine, dentistry, veterinary medicine, teaching, and natural resource management. A Biology major considering graduate or professional school should confer with a Biology advisor to plan a program to meet the student's specific needs and assure entrance into such a school.

The Bachelor of Arts in Biology provides an introduction to the discipline and an opportunity to integrate the study of Biology with another field. In contrast to the B.S. program, the B.A. requires fewer credits in both biology and related sciences, permitting a student to complete a second major or additional courses in another discipline such as Chemistry, Psychology, Elementary Education, Journalism, Art, Management, or Computer Science; thus, it satisfies the needs of students with a combination of interests.

The minor program in Biology is designed to permit students majoring in another field to pursue a program of study in the life sciences, this minor includes a set of core courses that introduce the most important concepts in biology as well as upper-level electives dictated by the personal interests of the student.

### **SUMMARY**

The Biology Department's program goals support the College's mission and values. We "prepare promising students to think critically and creatively" by integrating a challenging variety of problem-solving activities into all of our courses and offering opportunities to engage in scientific research both in and out of the classroom setting. We assess student performance in a variety of meaningful ways and have moved beyond standardized multiple choice exams and cookbook laboratory "experiments." We "prepare students to engage in active citizenship" by helping them to understand how and why science is relevant to our society and their future and exposing them to a variety of ways in which they can contribute as future scientists. We "prepare students to pursue meaningful work" by offering a broad curriculum (from molecules to ecosystems), teaching valuable scientific skills, and actively mentoring our students.

### **SECTION 5: DESIGN OF PROGRAMS**

The Biology Department offers three programs: the B.S. in Biology, the B.A. in Biology and the Biology minor. Our programs have undergone significant revisions over the past 10 years, including the addition of sophomore-level courses as part of our core requirements in 2002 and the transition to the four-credit model in 2007. With the transition to the four-credit model came the introduction of several courses in which the laboratory component is integrated into the lecture component.



## *COURSE NUMBERING AND SEQUENCING RATIONALE*

100-level courses: introductory courses; no pre-requisites; may be taken in any sequence; however, typically incoming freshmen take BIO 110 (only offered in fall) followed by BIO 111 (only offered in spring); labs are integrated with lecture

200-level courses: sophomore-level courses that require BIO 110 and 111 as prerequisites; BIO 210 Ecology is only offered in fall, while BIO 211 Genetics and 212 Cells and Physiology are offered only in spring; all courses have labs integrated into the lecture

300 and 400-level courses: for majors that have completed their 100 and 200-level requirements; typically 400-level designation signifies that senior standing is recommended (but not required), BIO 495 Senior Seminar is offered in fall of the senior year

Note: A recommended course sequence for students in the B.S. Program and planning sheets for the B.S., B.A., and Minor programs in Biology are included in the appendices.

## *BIOLOGY, BACHELOR OF SCIENCE*

The Bachelor of Science program in Biology is designed to stimulate intellectual and personal growth through an examination of the fundamental properties of living systems, the application of experimental and descriptive methods of discovery, and the consideration of the social, ethical, and aesthetic aspects of biological knowledge. The B.S. program also provides undergraduate preparation for technical employment or post baccalaureate study in graduate school, or professions such as medicine, dentistry, veterinary medicine, teaching, and natural resource management. A Biology major considering graduate or professional school should confer with a Biology advisor to plan a program to meet the student's specific needs and assure entrance into such a school.

*Major Requirements = 76 credits*

### Core Courses (24 credits)

- BIO 110 Molecules and Cells\*
- BIO 111 Evolution\*
- BIO 210 Ecology
- BIO 211 Genetics
- BIO 212 Cells and Physiology
- BIO 495 Senior Seminar

\* Students must earn grades of C or higher in both BIO 110 and BIO 111 in order to take any 200-level or higher BIO course.

### Upper-Level Courses (24 credits)

*Take one course from each of the following four categories (16 credits).*

#### Animal Diversity

- BIO 333 Invertebrate Zoology
- BIO 334 Vertebrate Zoology
- BIO 335 Ornithology

#### Plant and Microbial Diversity

- BIO 363 Plant Biology
- BIO 365 Plant Evolution
- BIO 367 Microbial Diversity

## Ecology and Evolution

- BIO 343 Ecosystem Ecology
- BIO 345 Animal Behavior
- BIO 347 Plant Physiological Ecology
- BIO 349 Population Genetics

## Cell/Molecular/Physiology

- BIO 371 Ecophysiology
- BIO 373 Neurobiology
- BIO 375 Biochemistry
- BIO 376 Molecular Biology
- BIO 377 Immunology
- BIO 379 Comparative Animal Physiology

## Upper-Level Elective Courses

*Choose any two 300- or 400-level BIO courses to bring total credits in Biology to 48 credits*

## Related Science/Math Courses (28 credits)

- CHEM 111 General Chemistry I
- CHEM 112 General Chemistry II
- CHEM 221 Organic Chemistry I
- CHEM 222 Organic Chemistry II
- PHYS 141 College Physics I
- PHYS 142 College Physics II
- MATH 141 Introductory Statistics

## Electives

*Select additional courses to reach a total of 122 credits for the degree.*

For a dual major in Education, please refer to the appropriate Education program option.

## *BIOLOGY, BACHELOR OF ARTS*

The Bachelor of Arts in Biology provides an introduction to the discipline and an opportunity to integrate the study of Biology with another field. In contrast to the B.S. program, the B.A. requires fewer credits in both biology and related sciences, permitting a student to complete a second major or additional courses in another discipline such as Chemistry, Psychology, Elementary Education, Journalism, Art, Management, or Computer Science; thus, it satisfies the needs of students with a combination of interests.

*Major Requirements = 52 credits*

## Core courses (20 credits)

- BIO 110 Molecules and Cells\*
- BIO 111 Evolution\*
- BIO 210 Ecology
- BIO 211 Genetics
- BIO 212 Cells and Physiology

\* Students must earn grades of C or higher in both BIO 110 and BIO 111 in order to take any 200-level or higher BIO course.

## Upper-Level Courses (16 credits)

*Take one course from each of the following four categories (16 credits).*

### Animal Diversity

- BIO 333 Invertebrate Zoology

- BIO 334 Vertebrate Zoology
- BIO 335 Ornithology
- Plant and Microbial Diversity
  - BIO 363 Plant Biology
  - BIO 365 Plant Evolution
  - BIO 367 Microbial Diversity
- Ecology and Evolution
  - BIO 343 Ecosystem Ecology
  - BIO 345 Animal Behavior
  - BIO 347 Plant Physiological Ecology
  - BIO 349 Population Genetics
- Cell/Molecular/Physiology
  - BIO 371 Ecophysiology
  - BIO 373 Neurobiology
  - BIO 375 Biochemistry
  - BIO 376 Molecular Biology
  - BIO 377 Immunology
  - BIO 379 Comparative Animal Physiology
- Related Science/ Math Courses (16 credits)
  - CHEM 111 General Chemistry I
  - CHEM 112 General Chemistry II
  - MATH 141 Introductory Statistics
- One of the following:
  - PHYS 141 College Physics I
  - GEOL 201 Introductory Physical Geology

#### Electives

*Select additional courses to reach a total of 120 credits.*

For a dual major in Education, please refer to the appropriate Education program option.

#### *BIOLOGY MINOR*

Designed to permit students majoring in another field to pursue a program of study in the life sciences, this minor includes a set of core courses that introduce the most important concepts in biology as well as upper-level electives dictated by the personal interests of the student.

*Minor Requirements = 24 credit*

#### Core Courses (20 credits)

- BIO 110 Molecules and Cells\*
- BIO 111 Evolution\*
- BIO 210 Ecology
- BIO 211 Genetics
- BIO 212 Cells and Physiology

\* Students must earn grades of C or higher in both BIO 110 and BIO 111 in order to take any 200-level or higher BIO course.

#### Upper-level elective course (4 credits)

*Choose any 300- or 400-level BIO course to bring total credits in Biology to 24 credits*

One of the first observations one might make about our B.S. program is that there are no specialized tracks within the program and that all of our majors are required to take a broad diversity of coursework. This design is intentional and reflects the general philosophy of the KSC Biology faculty that exposure to and appreciation of the many sub-disciplines of biology is beneficial to our students and to the field and is highly compatible with the liberal arts mission of the College.

Biology is an interdisciplinary science which requires a firm grounding in the physical, as well as the life, sciences. The rationale for requiring certain courses (including those in other disciplines such as Math, Chemistry, and Physics) while allowing for the election of others was the subject of much discussion when Biology transitioned to the four credit model, necessitating a decrease in the number of required courses. Requirements for biochemistry and a semester of calculus were dropped from the new B.S. program. Almost all graduate programs in biology-related fields and many professional programs (medical, dental, and pharmacy schools) require a year of organic chemistry, a year of physics, and a statistics course. A few do require biochemistry and/or a semester or year of calculus. Students who want to be as broadly prepared as possible are advised to take biochemistry (which also fulfills a category requirement) and a year of calculus.

In addition, we currently require students to select upper-level courses from four different categories: animal diversity, plant and microbial diversity, ecology and evolution, and cell/molecular/physiology to ensure they are broadly exposed to and appreciate the contributions of the many subdisciplines of biology

SINCE OUR LAST PROGRAM REVIEW, FOUR SIGNIFICANT CHANGES IN OUR PROGRAMMATIC DESIGN HAVE OCCURRED:

- 1) Sophomore-level core course requirements were added in 2002. The sophomore curriculum was added to introduce a more developmental approach to teaching biology after faculty struggled teaching upper-level courses to a combination of sophomores, juniors, and seniors. The sophomore curriculum itself has undergone some changes since its implementation. Most notably, we moved from requiring four lecture courses (Genetics, Ecology and Evolution, Physiology of Plants and Animals, and Cell Biology) and two of four possible laboratory courses (Experimental Genetics, Ecology and Evolution Lab, Experimental Physiology, and Research Rotations) to now requiring three integrated lab/lecture core courses (Genetics, Cells and Physiology, and Ecology). The result of this change is that now every sophomore class has a laboratory component.
- 2) A 2-credit senior capstone course was added in 2002. The senior seminar was originally introduced as “a capstone experience that refines basic skills and concepts through an exploration of specific themes in scientific literature.” With the implementation of the four-credit model in 2007, it was transformed into a four-credit capstone course where students advance their experience and knowledge, recognize their important roles as scientists, and prepare for professional careers and post graduate opportunities. The course was also moved from the spring to the fall of the senior year to provide more timely help with post-graduate planning.
- 3) In 2007, along with the rest of the College, Biology moved to a four-credit model. At that time, several courses were implemented in which lab and lecture activities were integrated. This movement to integrated laboratory lecture classes in which classes typically meet in our teaching for either lecture or

lab or a mixture of activities is likely to be one of our most innovative curricular revisions. It evolved from our collective impression that, in comparison to lecture, lab activities were undervalued. Separate lab courses were typically worth much fewer credits than the corresponding lecture course at a time when trends in science education were calling for more hands-on experiences in the sciences. Integration allows for better coordination of lecture and lab activities and reduces the workload of students who now manage fewer courses than when labs were separate courses. Integration of lab activities also avoids one of the problems experienced by science faculty at KSC, the undervaluing of lab courses when determining teaching loads. Although our labs have evolved from standard cookbook-type labs to those that are inquiry-based and multi-dimensional, the College does not count, for example, a four hour lab experience as four hours of teaching. The effectiveness of integrative lab/lecture experiences is hard to assess at this point because we are still in the process of adapting our courses and finding the right balance between the lecture and laboratory components.

- 4) As part of the implementation of the four credit model, the introductory sequence for majors was revised. The introductory sequence transitioned from Life: Diversity (fall) and Life: Processes (spring) to BIO 110 Molecules and Cells (fall) and BIO 111 Evolution (spring). In addition, to revision of course content, the new introductory course sequence has integrated lab with lecture activities.

## SECTION 6: CONTRIBUTIONS TO INTEGRATED STUDIES PROGRAM (ISP)

The Biology Department has always had a strong commitment to non-majors courses and contributed significantly to the former General Education and current Integrated Studies Programs (implemented in fall 2007). We have developed new courses for the Integrated Studies Program including for both of the Foundations courses: ITW Thinking and Writing and IQL Quantitative Literacy and for the Perspectives (INBIO) courses. The only ISP category to which we have yet to contribute is the interdisciplinary (II) perspective courses.

*Table 6.1. Numbers of ISP sections offered by Biology since 2007. Note that the final column (Fall 09) provides data for a single semester.*

ISP Category	AY 2007/08	AY 2008/09	Fall 09
Thinking and Writing	2	0	1
Quantitative Literacy	1	1	0
Perspectives INBIO 100-level	25	15	10
Perspectives INBIO 104	6	5	0
Perspectives INBIO 300-level	0	2	5

We offer two different types of 100-level Perspectives courses (INBIO 100 and INBIO 104). The INBIO 104 course offerings provide significant laboratory experiences for non-majors (including education majors). One of the 100-level offerings (Tropical Marine Biology) provides a significant study abroad component. The

Department plans to expand its non-majors study abroad options. As seen in Table 7.1, the Biology Department has responded to the call for more 300-level Perspectives offerings in AY 09/10.

The titles for the various courses that have been offered under the five categories listed above, their catalog descriptions (INBIO only), and the faculty responsible for developing and teaching them are listed below.

*Note: Full-time, tenure track faculty have an asterisk next to their name.*

#### ITW 101 Thinking and Writing

A Brave New World is Here (Susan Whittemore\*)

Plants in Science and Literature (Kristen Porter-Utley\*)

#### IQL 101 Quantitative Literacy

Counting on Conservation (Karen Cangialosi\*)

#### INBIO 100 (and 103) Topics in Biology

Catalog Description: An exploration of biological issues and methods for nonmajors. Applying basic principles to modern problems, the course may focus on a theme such as evolution and conservation of biodiversity, plants and society, or ecology and environmental issues. Can be repeated for elective credit but not ISP credit as topics change. Fall, Spring.

New Perspectives (Julia Imberato)

Plant Diseases (Carolyn Wheeler)

Topics in Human Development and Aging (Robert Anzalone)

Conservation of Natural Resources (Davis Chesemore)

Plants and Human Affairs (Kristen Porter-Utley\*)

Evolution and Genetics of Sex (Ken Bergman\*)

Biology of Plagues (Loren Launen\*)

Genetics and Society (Scott Strong\*)

Introduction to Human Physiology (Nancy McDade)

Tropical Marine Biology (Karen Cangialosi\*)

Tropical Biology (Cliff Lerner\*)

Barely Tolerating Yourself (Scott Strong\*)

Body Systems (Todd Jarry)

Mad Dogs, Mad Cows, and More (Sue Piscopo)

#### INBIO 104 : Lab Biology Topics

Catalog Description: An integrated lecture-lab course for nonmajors that explores biological topics through hands-on investigative activities. Will focus on a theme, such as marine biology or ecology. Can be repeated for elective credit but not ISP credit as topics change. Will satisfy the lab science requirement for education majors. Fall, Spring.

Freshwater Ecology (Patrick Eggleston\*)

Biology of Plagues (Loren Launen\*)

#### INBIO 300: Advanced Topics in Biology

Catalog Description: Topics in the biological sciences such as genetics, health, ecology, and others will be explored at an in-depth level. Socially relevant and ethical issues such as AIDS, genetic engineering, embryo research, environmental crises and other issues will be emphasized. Prerequisite: 24 credits in ISP, including ITW 101 and IQL 101. Fall, Spring.

Evolution and Genetics of Sex (Ken Bergman\*)

Barely Tolerating Yourself (Scott Strong\*)

The A.R.T. of Reproduction (Sue Piscopo)

It is important to note that many of these courses are taught by full-time, tenure-track faculty and the offerings are both creative and diverse. It should be evident that the contributions of the Biology Department to the Integrated Studies Program are significant and numerous and that they reflect our ongoing commitment to scientific literacy for all students in support of the liberal arts mission of the College and our own Biology mission statement. This commitment is also reflected in our job ads which make clear that there is an expectation of all new faculty to develop and offer an ISP course.

## SECTION 7: CONTRIBUTION TO OTHER ACADEMIC PROGRAMS ON CAMPUS

In addition to serving students who major or minor in Biology, the Biology Program serves students who major in Chemistry, Environmental Studies, Health Sciences, Education and General Science, Individualized Majors and fulfills an important role in providing courses for the Integrative Studies Program required of all KSC students. Table 7.1 describes the Biology courses taken by majors in the areas most strongly served by Biology, and provides the number of students that are declared in those majors as of 2008.

*Table 7.1. Biology Program Contributions to Most Relevant Majors.*

Major	Biology Course	Number of Students in Major (declared as of 2008) <sup>1</sup>
Health Sciences (BS)	Human Anatomy and Physiology (BIO 230 and 232) <sup>2</sup> Cell and Microbial Biology (BIO 240) <sup>3</sup>	201 (all Health Science majors) 112 (nutrition option only)
Chemistry (BA/BS)	Cells and Molecules (BIO 110)	13
Environmental Studies (BS)	Evolution (BIO 111) <sup>4</sup> , Ecology (BIO 210) <sup>4</sup> Ecosystem Ecology (BIO 343) <sup>5</sup> or Plant Physiological Ecology (BIO 347) <sup>5</sup>	26 (all Environmental Studies majors) 14 (Environmental Studies majors who are pursuing the Environmental Science option <sup>3</sup> )
General Science (BS)	Cells and Molecules (BIO 110), Evolution (BIO 111), Ecology (BIO 210)	4

<sup>1</sup>Source KSC Factbook at <http://www.keene.edu/ir/>, 2008.

<sup>2</sup> Courses required of all Health Science majors.

<sup>3</sup> Course required of Health Science majors who are enrolled only in the Nutrition option.

<sup>4</sup> All Environmental Studies majors as of 2008 were required to take these courses.

<sup>5</sup> Environmental Studies majors who opted for the Environmental Science path must take either Ecosystem Ecology (BIO 343) or Plant Physiological Ecology (BIO 347)

Support for the education programs has changed considerably in the last four decades in reflection of changes in methods and approaches in the areas of both science and education. Historically the Biology Program has been well connected to the Education program at KSC; indeed, as described in Section 1 the Biology Program originated as a concentration area for the KSC secondary education Program in AY 1964/65. Currently the Biology Program serves Education students in three main ways: 1) Students choose the Biology BA or BS as the second content area major for Education students, 2) Biology coursework is prescribed for the General Science content area major (see Table 7.1) and 3) Graduates of the Biology majors (BA or BS) subsequently

enroll in either the Post Baccalaureate Teacher Certification or Masters Degree and Teachers Certification option provided by Education. With regard to 1) Table 7.2 depicts the relationship between Education major and Biology or General Science as a content area major, with regards to the resulting NH State Certification Education students can achieve. As of AY 08/09 there are two students double majoring in Biology (BA) and Secondary Education.

*Table 7.2. Education and Content Area Major Combinations and Resulting Options in NH State Certifications Supported by the Biology Program.*

<b>Majors</b>	<b>Certification (Grade level, subject)</b>
Biology and Secondary Education	Grades 7-12, Biology
Biology + Elementary	Grades K-8 (all subjects)
Biology + Early Childhood	Birth-Grade 3 (all subjects)
General Science + Secondary Education	Middle School (grades 5-9), General Science
General Science + Elementary	Grades K-8, (all subjects)
General Science + Early Childhood	Birth-grade 3, (all subjects)

The Teacher Certification program provides a Post-Baccalaureate Teacher Certification Program which allows students to receive NH State Certification for teaching Biology to Grades 7-12. This is an Education Program offered by KSC to qualified candidates, further described at: <http://www.keene.edu/catalog/programs/grad/pbac.cfm>. Students can also apply for a Master's in Education linked with a Certification Program, described at <http://www.keene.edu/catalog/programs/grad/master.cfm>. As of AY 08/09 there is one student enrolled in the Post-Baccalaureate Teacher Certification Program in Biology.

From time to time students at KSC choose to pursue the Individualized Major the College provides and work with a Biology faculty advisor to design a major that focuses on Biology. Typically these students will also work with an advisor in another area, such as Health Science or Psychology, to structure their major. An example of such an individualized major combining Biology and Psychology to obtain sufficient qualifications as to allow the student to pursue entrance to medical schools and MD/PhD programs is included in the Appendix. The particular student was successful in gaining entrance from several medical school programs and two MD/PhD programs, and managed to complete his KSC undergraduate degree in only three years. The work of the Biology faculty advisor in this case, who both helped the student to design their individualized major, and provided the student with the opportunity to pursue research opportunities within the faculty member's research program, was an integral to the student's successful entrance to the MD/PhD program of their choosing.

The Biology Program contribution to the KSC ISP program is discussed in Section 6 and includes a description of the courses offered and their enrollments.



## SECTION 8: COURSES OFFERED AND STUDENTS SERVED

The Biology B.A., B.S. and minor were described in section 5. Table 8.1 describes enrollment in the Biology Program within the B.A. and B.S. and the Minor, as well as enrollment in the total Biology courses offered by student number and total credit hours (Fall semester only), from the time of the last Program review in 1999 to the present. Figure 8.1 depicts the enrollment number of Biology majors graphically to better represent trend in numbers of majors. In the past 10 years the enrollment in Biology majors has increased from 40 in 1999 to 74 in 2009, representing an almost two-fold increase. The proportion of students choosing the B.S. versus the B.A. has increased from 0.65 to 0.78 in the same time period as the BS degree continues to gain in popularity. Although we have no survey or other data to support this, Biology faculty report anecdotal evidence indicates that the increasing popularity of the B.S. degree relative to the B.A. is because students perceive the more rigorous requirements (greater course number) of the B.S. may better prepare them for a future career in the sciences. The number of students obtaining a minor in Biology has not changed significantly in the past 10 years (Table 8.1).

*Table 8.1: Biology Program Enrollment (1999 – 2009)<sup>1</sup>*

<b>Year</b>	<b>Fall only – # of Students Enrolled in Biology Courses</b>	<b>Fall Only – Total Credit Hours</b>	<b>Declared Majors BA<sup>2</sup></b>	<b>Declared Majors BS<sup>2</sup></b>	<b>Declared Minors</b>	<b>Graduating Seniors - BA</b>	<b>Graduating Seniors - BS</b>
1999	1248	3612	14	26	4	7	18
2000	1190	3128	8	28	4	10	9
2001	1087	2966	6	25	5	4	4
2002	1164	2983	4	25	3	0	7
2003	1240	3317	6	32	3	1	15
2004	1218	3422	2	35	3	2	8
2005	1174	3225	4	45	4	5	9
2006	1177	3224	12	38	3	1	9
2007	849	3396	11	40	2	7	12
2008	919	3664	11	51	6	10	11
2009	na	na	16	58			

<sup>1</sup>Source: <http://www.keene.edu/ir> , factbooks and personal communication Tom Richards).

<sup>2</sup> Includes students pursuing a second major.

na – data not available at the time of writing.

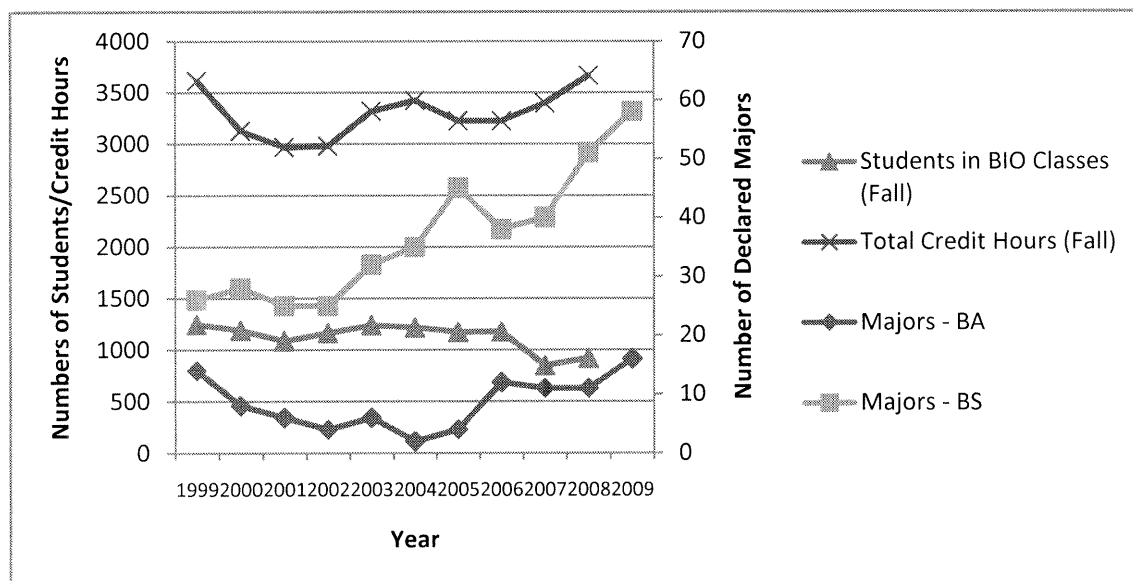


Figure 8.1. Trends in the number of students enrolled in Biology classes by student number and credit hours. Data for total student number and credit hours is based on fall semesters only (left vertical axis) and thus does not include Fall 09 data. Number of declared majors (right vertical axis) includes declared majors up to and including Spring 09.

Examination of the number of total students enrolled in Biology courses and the number of total credit hours (fall semester only) over the past 10 years (Table 8.1 and Figure 8.1) indicates that although there has been some fluctuation over the past decade, in general the numbers remain relatively constant. The impact of the 4 credit model (implemented in 2007) which reduces the total number of classes that students take while increasing the number of credits for many of those classes from 3 credits to 4 credits, is apparent when one examines the decline in the number of students in biology classes in 2007 (relative to 2006) which is concomitant with an increase in total credit hours. In general the number of students, and the number of total credit hours, are not markedly altered in the past 10 years although there is some suggestion of increased numbers for both in the last two years.

Table 8.2 depicts the student enrollment in “core” Biology courses from Fall 2001 to Spring 2009 and was constructed using data provided by Institutional Research (see Appendices for raw data). Enrollment trends are difficult to determine given the changes in the Biology Program resulting from the conversion to the four credit model and concomitant re-design of the Biology Program. However, a general trend towards increased enrollment in all of the core courses in the years 2007 – 2009 (where data is available) is suggested. Table footnotes explain some anomalies in enrollment. Enrollment in courses provided for the ISP program is provided in Section 6.

Table 8.2. Student Enrollment in Core Biology Courses From Fall 2001 to Spring 2009.  
Data Source: Institutional Research, raw data provided is included in the Appendices.

Courses <sup>1</sup>	Year								
	2001 <sup>2</sup>	2002	2003	2004	2005	2006	2007 <sup>3</sup>	2008	2009 <sup>4</sup>
<b>100-Level</b>									
Life Diversity/Evolution	79	80	92	87	77	98	34	105	125
Life Processes/Cells&Molecules		80	75	72	75	68	185	106	
<b>200-Level</b>									
Genetics		33	33	21	34	23		44	38
Ecology&Evolution/Ecology	22	23	34	30	36	28	44	62	
Cells/Cells&Physiology		16	22	22	20	20	24	41	28
<b>Upper Division</b>									
<b>Senior Seminar</b>						13	9	9	

<sup>1</sup> Students in the Biology BA, BS and minor must take the 100 and 200 level core courses. Only students in the Biology BS must take the Senior Seminar. Life Processes was re-designed and became Cells and Molecules which was implemented in 2007 as part of the new 4 credit program. Likewise, Life Diversity was re-designed into Evolution in 2007. Cells became Cells and Physiology in 2006. Senior Seminar was instituted in 2006 as part of the program re-design of 2005.

<sup>2</sup> Only Fall 2001 data was provided by Institutional Research, thus, as Life Processes and Cells were Fall courses there is no enrollment provided.

<sup>3</sup> The new program accompanying the conversion to the four credit model was implemented in Fall of 2007. Accordingly, enrollment in Life Processes/Cells and Molecules was elevated because the course was offered in both Spring and Fall of 2007. Likewise, Genetics, which has previously been offered in the Fall, was not offered for one full year (not in Spring or Fall of 2007).

<sup>4</sup> Only Spring 2009 data was available at the time of this writing, thus there are no 2009 enrollments for Cells and Molecules or Ecology which are both Fall course offerings.

Table 8.3 depicts the balance of courses available through the Biology program with regards to the number of upper and lower division courses. As described in section 1, in the past 10 years the Biology Department has changed its curriculum significantly on two separate occasions, once in 2000/2001 and again in 2007/2008. The change in 2000/2001 resulted in the implementation of a developmental, student-centered approach where courses in Biology were prescribed at the 100 and 200 level, providing the foundation for subsequent courses at the upper level. At this time, as described In 2007/2008 the new program furthered the effort to make the program more student centered and streamlined by reducing the total number of courses, maintaining the developmental approach, and removing the requirements for Calculus and Biochemistry from the BS to allow students more choice in their coursework and flexibility in their scheduling. Students who are interested in pursuing graduate studies (which typically require Calculus and often Biochemistry) are advised to take these courses in preparation, but all students in the BS are now given the choice. All Biology faculty teach a combination of core courses (100 or 200-level) and upper-level courses.

Table 8.3. Balance of Upper and Lower Division Courses<sup>1</sup> in the Biology Program as listed in the Keene State College catalog (1999 – 2009).

Academic Year	# of Lower-division courses (1XX or 2XX)	# of Upper-division courses (3XX or 4XX)	Total number of courses <sup>1</sup>	Ratio of Lower to Upper Division Courses
1999/2000	14	34	48	0.41
2000/01, 2001/02	20	30	50	0.67
2002/03	20	28	48	0.71
2003/04	22	25	47	0.88
2004/05 & 2005/06 & 2006/07	22	25	47	0.88
2007/08 <sup>2</sup> & 2008/09	16	20	36	0.80

<sup>1</sup>Defining "course" as the number of Biology courses listed in the KSC Catalog, including 1 credit lab courses.

<sup>2</sup> This year was the first year where the four credit curriculum and biology program were implemented.

## SECTION 9: STUDENT LEARNING OUTCOMES

The student learning outcomes for the Biology program are included in the Appendices and listed in section 3 of this document. The mission of the Biology Department states that “through our programs, students will develop an understanding of all forms of life, their evolutionary histories and relationships, and their interactions at levels of integration ranging from the molecular to biospheric.” Learning outcome I directly addresses this aspect of our programmatic mission by stating students will be able to demonstrate understanding in the following fundamental areas of biology: biological diversity (the various forms of life and their relationships), evolution, sub-organismal biology (from the molecules of life to organ systems), organismal biology (individual species and their traits), and supra-organismal biology (populations, communities, ecosystems, and biomes). Learning outcome II states that students understand the many aspects of the scientific process which relates directly to our mission to “teach students the scientific method, a mode of inquiry involving rational observation, experimentation, and critical analysis.”

The communication of scientific knowledge, included in outcome II as well as outcome III, is important to the scientific process and preparation of our students for “graduate programs in biology and for a broad-range of biology-related careers.” Finally, learning outcome IV which states that students will develop intellectual independence, scientific literacy, and an appreciation for the connections between biological science and society directly supports the liberal arts mission of Keene State College and the Biology Department “through the cultivation of an appreciation of natural science and its relevance in society for all Keene State College students including non-Biology majors.”

## SECTION 10: STUDENT LEARNING OUTCOMES ASSESSMENT

As described in the current assessment plan for Biology (see appendices), three different methods for assessing student outcomes (see appendices) are employed:

- 1) To assess Learning Outcome I, we developed our own assessment exam to assess whether students demonstrate understanding of the following five fundamental content areas in the biological sciences: biological diversity, evolution, sub-organismal biology, organismal biology, and supra-organismal biology. A sixth section was added to this exam to assess to aid in the assessment of Learning Outcome II, specifically the ability to develop testable hypotheses and design experiments to test those hypotheses. The exam has been administered as part of BIO 495 Senior Seminar.
- 2) Other aspects of Learning Outcome II and Learning Outcome III (ability to think critically and communicate the results of experiments effectively) are to be assessed through a review of scientific lab reports generated in a variety of upper-level courses using a common rubric.
- 3) Learning Outcome IV, the development of intellectual independence, scientific literacy, and an understanding of the interactions between science and society are to be assessed through successful participation in BIO 495 Senior Seminar.

The Biology Department was one of the first departments on campus to develop and implement an assessment exam (in 2003). Implementation of the assessment exam (see plan in appendices) initially provided some valuable insight into what we interpreted as a significant gap in our students understanding of key concepts in evolution. Based on three years of data, as part of its transition to the four-credit model in 2007, Biology transformed one of its introductory courses, Life: Diversity, into a course titled Evolution.

Presently, however, the Biology Department is struggling with several problems with its current assessment plan. A few of these issues are as follows:

The assessment exam is lengthy and is a chore to develop, administer, and grade. The small sample size does not lend itself to statistical analysis making it difficult to interpret the results of our assessment. We have been very disappointed with student performance on the exam. Because it is administered during Senior Seminar, a course taken only by students enrolled in the B.S. program, we are not assessing our many B.A. students on their understanding of fundamental biological concepts. In addition, we currently don't allow students to study or prepare in any way for the exam (although it counts toward their grade in the course). Since most of the concepts were covered during the introductory core course sequence (with the hope they would be reinforced in later coursework), it's quite possible that students have not been exposed to the material directly and in that form for 2-3 years. Therefore, we are testing retention in addition to understanding. Revisions that will be adopted in 09/10 that may help with some of these issues include adopting the use of a purchased, standardized test. Students in the B.A. program will now be required to take Senior Seminar.

While most faculty require some sort of written report in their upper-level courses, many do not require a traditional scientific report, making it difficult to use a common rubric to assess the ability to communicate the results of a scientific experiment effectively and accurately. While all of the Biology faculty feel strongly that the outcome is an important one, none want to be required to adhere to a restrictive format for their major writing assignment for the purpose of assessment.

We are unsure of how to use participation in senior seminar effectively as an assessment tool. While the course goals and objectives are clearly in line with Learning Outcome IV, how does one assess "participation?"

It is safe to state that despite spending countless hours developing an assessment plan and exam, the Biology faculty are feeling quite dissatisfied, even frustrated, with their current program assessment strategy and are in need of guidance. We know that we are doing an excellent job preparing our students for medical school, graduate school, and employment in biotechnology and the natural sciences because they are competitive with students from other institutions and because they tell us they were well-prepared. We need a plan that provides meaningful insight into whether our students are achieving the learning outcomes we developed for our programs, a plan that can be administered efficiently and effectively. We hope to gain some insights and suggestions from the outside reviewers as a part of the program review process.

## **SECTION 11: ADVISING**

A complete academic advising plan for the Biology Department was developed and submitted to the College in Fall 2008. That plan is included in the appendices of this document.

The general strategy for advising our students starts with the use of group advising sessions in the fall of the year to discuss with interested, mostly undeclared, students the differences among the programs we offer (B.S., B.A., and the minor), to distribute advising materials (program planning sheets, recommended course sequencing, and information about the Biology Club, research opportunities in Biology, and career options), and to instruct on the procedure for declaring a major in Biology and finding a permanent academic advisor. The Chair of Biology assigns new advisees on a rotating basis to keep numbers of advisees equal among the faculty. Faculty advisors offer one-on-one advising sessions to each of their advisees during the registration periods and on an as-needed basis. Biology Senior Seminar (BIO 495) offers an additional opportunity to provide career advising and assist students with generating resumes, cover letters, and essays for post-graduate programs and employment. Current official advising loads consist of 12-15 students per FTTT faculty member.

In general, our system of advising works very well and our majors get a great deal of valuable mentoring, advice, and individual attention. The need for pre-medical advising has, however, grown dramatically over the past 2-3 years with students from disciplines other than Biology (over 20 students in 2008/09) seeking advice on getting into medical school, dental school, and physician assistant programs. This situation has created an unmanageable burden for Susan Whittemore, the unofficial pre-medical advisor, who has a full load of Biology majors to advise as well. Whittemore has worked over the past 6 years with Dartmouth Medical School on the Medical Student for a Day Program where students get to spend a day at DMS with current medical students and meet with admissions personnel. A Blackboard site called "The Health-Related Pre-Professional Network" was constructed by Whittemore to help disseminate information to interested students on how best to prepare for health-related professions. While these advising tools can be made available to students from other departments fairly easily and do help somewhat to meet the increased demand for premedical advising, it is hoped that the administration will move soon to create a pre-medical advisory committee consisting of 3-4 faculty to reduce the burden of one-on-one advising and of writing letters of recommendation.

## **SECTION 12: FULL-TIME FACULTY**

Table 12.1 describes the current Biology FTTT faculty including their educational qualifications (excluding post-doctoral experience), their current rank at KSC and areas of research and scholarship. Table 12.2 describes the current Biology FTTT teaching fields and courses offered within the past 5 years. Table 12.3 summarizes recent (since 2004) faculty service contributions and Table 12.4 summarizes recent (since 2000) grant writing activities as examples of scholarly activities. CV's included in the Appendices contain additional information

on courses taught beyond the past five years, details on scholarship including research and other activities defined as scholarship in the KSC Faculty Handbook (available at <http://www.keene.edu/admin/handbooks.cfm> ), and service contributions.

*Table 12.1. Biology FTTT Qualifications and Areas of Research and Scholarship*

<b>Faculty</b>	<b>Educational Qualifications</b>	<b>Appointed to KSC</b>	<b>Current Rank, Date Obtained</b>	<b>Areas of Research and Scholarship</b>
Dr. Patrick Eggleston	Ph.D, Zoology & Ecology, Ohio State University M.S., Pomology and Plant Physiology, Cornell University BS, Horticulture, Michigan State University	1975	Professor, 1987	Ecology, limnology, phycology, evolution, conservation of biodiversity.
Dr. Kenneth Bergman	Ph.D, Cell & Developmental Biology, Harvard University A.B. Zoology, U.C. Berkeley A.A. Biology, Bakersfield College	1979	Professor, 1993	Genetics, vertebrate zoology, ornithology, evolution, animal systematic, conservation biology.
Dr. Karen Cangialosi	Ph.D, Zoology, Miami University M.S., Biological Sciences, University of Cincinnati B.A., Biological Sciences, University of Maryland Baltimore County	1992	Professor, 2001	Behavioral ecology, population ecology, invertebrate zoology, spider behavior, tropical marine biology, women's studies.
Dr. Susan Whittemore	Ph.D., Physiology, Dartmouth College M.S., Wildlife Biology, Utah State University B.S., Wildlife Biology, S.U.N.Y. College of Environmental Science and Forestry and Syracuse University	1993	Professor, 2002	Animal physiology, endocrinology, molecular biology of invertebrate stress responses, physiology of endocrine disruption, developmental toxicology in vertebrates.
Dr. Scott Strong	Ph.D., Biological Science, Florida State University B.S., Zoology, Miami University	1998	Associate Professor, 2003	Cell and molecular biology, evolution of immunoglobulin genes, molecular biology of stress responses, ichthyology, marine tropical conservation biology.
Dr. Kristen Porter-Utley	Ph.D., Botany, University of Florida M.S., Botany with a minor in Anthropology (Specialization in Ethnobotany),	2004	Associate Professor, 2009	Evolution, plant evolution and systematics, plant biology, ethnobotany, conservation biology.

	University of Florida B.S., Environmental Horticulture, University of Florida			
Dr. Loren Launen	Ph.D., Biological Science, Simon Fraser University B.Sc. Biology (Specialization in Biomedical Toxicology), University of Guelph	2005	Assistant Professor	Environmental microbiology, microbial physiology, biochemistry and systematics, environmental analytical chemistry.

*Table 12.2. Teaching Fields and Representative Courses Taught Since 2004 by Biology FTTT Faculty.*

<b>Faculty</b>	<b>Courses Currently Taught for Biology Core/Major Requirements</b>	<b>Courses Currently Taught for ISP</b>	<b>Courses Currently Taught for Other Programs</b>
Dr. Patrick Eggleston	BIO 210 Ecology BIO 490 Aquatic Ecology	INBIO 104 Freshwater Ecology INBIO 101 Evolution and Conservation of Biodiversity	ENST 100 Intro to Environmental Studies
Dr. Kenneth Bergman	BIO 111 Evolution BIO 211 Genetics BIO 334 Vertebrate Zoology BIO 335 Ornithology	INBIO 105 Evolution and Genetics of Sex, INBIO 300 Evolution and Genetics of Sex	
Dr. Karen Cangialosi	BIO 111 Evolution BIO 210 Ecology BIO 333 Invertebrate Zoology BIO 345 Animal Behavior BIO 490 Advanced Tropical Marine Biology Senior Seminar BIO 495	INBIO 104 Tropical Marine Biology IQL 101 Counting on Conservation	WS 495 Women's Studies Capstone
Dr. Susan Whittemore	BIO 110 Cells & Molecules BIO 212 Cells & Physiology BIO 379 Comparative Animal Physiology BIO 371 Ecophysiology BIO 490 Endocrinology & Endocrine Disruption Senior Seminar BIO 495	INBIO 104 Exploring Genes ITW 101 A Brave New World is Here	
Dr. Scott Strong	BIO 110 Cells and Molecules BIO 375 Biochemistry BIO 376 Molecular biology BIO 377 Immunology	INBIO 101 Barely Tolerating Yourself	
Dr. Kristen Porter-	BIO 111 Evolution BIO 363 Plant Biology	INBIO 100 Plants and Human Affairs	



Utlely	BIO 365 Plant Evolution	ITW 101 Science & Literature of Plants	
Dr. Loren Launen	BIO 110 Cells and Molecules BIO 211 Genetics BIO 367 Microbial Diversity BIO 490 Microbial Ecology	INBIO 101 & 104 Biology of Plagues	BIO 290 Cell and Microbial Biology

*Table 12.3. Biology FTTT faculty representative service contributions since 2004 (please see CVs for complete detail and for service pre-dating 2004)*

<b>Faculty</b>	<b>Departmental Service</b>	<b>School Service</b>	<b>College Service</b>	<b>Community Service<sup>1</sup></b>
Dr. Patrick Eggleston	Microscope Comm, DPEC member-Launen	School Curriculum Comm		Ashuelot River Local Advisory Comm, Ashuelot River cleanup project, Ashuelot River Monitoring activities, Keene Wetland Comm, Keene Surface Water Protection Comm, author Surface Water Protection Comm Report to City (Keene)
Dr. Kenneth Bergman	Microscope Comm, Microbiology Search Comm, Biology Assessment Comm, DPEC member - Launen & Porter-Utlely, DPEC chair - Launen & Gebauer	DPEC member Abernethy (Chem)	NEASC Steering Comm, Chair NEASC Std 5 Comm, Thorne Art Gallery Advocacy Comm, KSC IACUC	Crotched Mtn Rehabilitation Center I.R. Board
Dr. Karen Cangialosi	Biology Dept. Chair, Search Comm (9 searches, see CV)		Women's Studies Program Coordinator, Co-chair Campus Commission on Diversity and Multiculturalism, Co-chair of organizing committee for the Keene State College Fourth Biennial World Affairs Symposium entitled, Globalization: Impact on Peoples of	American Arachnological Society, Treasurer and host of 2001 National Conference, Co-chair, Southwest NH chapter of GLSEN (gay, lesbian and straight education network), Campus Coordinator for New England Board of

			the World, Nov 3 – 5, 2005, Co-chair of the President's Commission on the Status of Women, Search comm. (Womens Studies), Council for a Sustainable Future	Higher Education Science/Engineering Academic Support Network for minority students, Organizer World Aids Day Activities
Dr. Susan Whittemore	Interim Chair, DPEC Chair - Kolodziejski, Porter-Utley, Launen,, Search Chair (Microbiology, Neurobiology), co-author Program Review	DPEC member – Abernethy (Chem), DPEC Director of Writing	FEAC, ISP Assessment Sub Comm (Ethics Outcome, Writing Perspectives Outcome)	State of NH Pesticide Review Board Member, Keene Conservation Comm
Dr. Scott Strong	Department Chair, Neurobiology Search Comm, Biology Club Advis, Biology Hnr Society Advis	Science Center Facility Planning Comm, Science Center Fundraising Comm, Assistant Dean SSSS	IACUC Chair, Faculty Athletic Rep. To NCAA, Integrative Studies Program Council, Summer Orientation	Keene High School Science Teacher Search Comm.
Dr. Kristen Porter-Utley	Biology Club Advisor, Assessment Comm, Search comm (A & P)	Search Comm, Dean's Assistant	Senator (College Senate), Academic Excellence Conference Comm	Ashuelot Valley Environmental Observatory Board Member
Dr. Loren Launen	Search comm (A&P, Neuro), microscope comm, AOC program review co-author	School curriculum committee, Sciences Environmental Health and Safety Committee, search comm(Physics)	NEASC standard 5 committee, Search committee (Health & Safety coord, OSPR dir), URG committee, Sidore committee	Project SEED mentor (1 summer)

<sup>1</sup> Community service in a professional capacity.

Table 12.4 Faculty External Grant-Writing Activities Since 2000

Faculty	Granting Agency	Grant Description	Awarded
Dr. Karen Cangialosi	Whiting Foundation (2001)	Development Funds for Marine Biology Course	\$6,000
Dr. Susan Whittemore	NIH BRIN Grant (2004-05)	Summer Research Experience for Undergrads	\$20,000
	NIH BRIN Grant (2003-04)	Summer Research Experience for Undergrads	\$12,000
	NSF-MRI (Major Research Instrumentation) Grant (2001)	Equipment for Molecular Physiology Research	\$169,265
Dr. Scott Strong	NIH BRIN Grant (2004-05)	Summer Research Experience for Undergrads	\$20,000
	NIH BRIN Grant (2003-04)	Summer Research Experience for Undergrads	\$12,000
	NSF-MRI (Major Research Instrumentation) Grant (2001)	Equipment for Molecular Physiology Research	\$169,265
	LiCor (2005)	Matching Funds for Purchase of Automated DNA Sequencer	\$50,000
Dr. Kristen Porter-Utley	NSF-REVSYS (Revisionary Syntheses in Systematics Grant) 2008-2011	Collaborative Research; Significant Undergrad Res. Component	\$188,482 (of total grant for \$1,227,210)

## *FACULTY EVALUATION*

While the general method whereby Biology faculty are evaluated for promotion and tenure follows the College-wide standards dictated in the KSC Employee Association Collective Bargaining Agreement and in the Faculty Handbook, each Department uses slightly different methods. In general, each faculty member undergoing evaluation (yearly until tenure and then every 2 years thereafter until the rank of Professor is achieved) prepares a file describing their accomplishments in the areas of teaching, scholarship and service. This file includes teaching observations conducted by colleagues in the Biology Department and other colleagues from outside the Department, student course evaluations, a portfolio of course materials, documentation of scholarship and service and a self-evaluation written by the faculty member under evaluation. The file is reviewed by the faculty member's Departmental Peer Evaluation Committee (DPEC) which writes a letter describing the faculty member's performance. The file is then reviewed by the Dean of Science who in turn writes a letter summarizing the faculty member's performance. In the year in which a faculty member is a candidate for promotion and/or tenure the file is then submitted to the Faculty Evaluation Advisory Committee (FEAC) who reviews the file and makes a recommendation for or against the candidate that is submitted to the Provost. The Provost then accepts or rejects the FEAC recommendation, and in turn recommends or does not recommend the candidate for promotion and/or tenure to the Board of Trustees.

The promotion and evaluation process is intended to constructively assist faculty develop and to support professional excellence, as evidenced by timely promotion and the achievement of tenure.

The Biology candidates for promotion or tenure have met with success in all cases since the last program review (1999). The Biology Department is recognized campus-wide as a model of efficiency and effectiveness with regards to the promotion and tenure process as we diligently attend one another's classes for conducting peer observations and carefully, but critically, review our candidate's files to ensure that the yearly reviews of untenured faculty are completed and comprehensive.

## *FACULTY WORKLOAD*

### *Teaching assignments*

Our discipline determines individual teaching assignments after first ascertaining its course needs, and we have tried to develop regular and predictable schedule cycles for specific courses as explained in Section 5. Because almost all of our courses include a laboratory component we often schedule courses into the longer time blocks provided by the four credit model. This requirement, as well as the need to avoid conflicts between Chemistry and Physics course scheduling (which also include laboratory components and thus utilize longer time blocks) renders Biology course scheduling challenging. In view of the very labor-intensive nature of lab intensive courses, which require tremendous amounts of raw physical preparation often including mundane tasks such as dish-washing, solution preparation and animal maintenance, the Dean of Sciences has interpreted a full workload as defined by the KSCEA Collective Bargaining Agreement with much-appreciated flexibility. Full loads are typically three sections (12 credit hours) and two preparations. Thus in most semesters Biology faculty are responsible for teaching two sections of one course, and one section of another, and are rarely asked to conduct three preparations per semester. 12 credit hours can translate to 12 - 15 hours per week of contact time because the teaching of laboratories is undervalued by the College and remains an ongoing issue for Science

faculty who work more hours than their colleagues in Arts and Humanities, for example. In addition, preparation for laboratories is very time-intensive and there is no compensation for this preparatory work.

### *Independent Study*

A concern held by all Biology faculty is the lack of recognition or compensation for teaching Independent Study courses to students. Biology is a labor-intensive field that is best learned in an educational environment that provides opportunities for extensive research experience. In today's competitive educational environment, students who wish to continue on into graduate school or other competitive areas such as medical school generally require research experience as undergraduates. The main way we can offer this to our students is to provide them with Independent Study opportunities. The number of Independent Study students is generally increasing (see Table 12.4 below), and accordingly more students are applying for and receiving Undergraduate Research Grants (URGs) from Biology in recent years. In the years 2005/06 and 2006/07 only two – three students per year typically applied for (and received) undergraduate research grants from Biology while in 2007/08 and 2008/09 students in Biology received 11 and 9 URG awards respectively. (personal communication, S. Ericson-West, Office of Sponsored Projects). These students are presenting at regional, national and international meetings and promoting both their own careers and the Biology Department at KSC.

The Biology faculty have a long history of offering such opportunities which have enabled many students graduating from our Programs to continue on to graduate or medical programs, as well as to secure high quality jobs in science-related areas. The work of offering Independent Study is substantial as students require one-on-one mentoring in order to accomplish anything on a research project and yet there is no credit given towards workload to faculty who supervise students through Independent Study. For example, one of the Biology faculty members has offered a total of 216 student credit hours in Independent Study over her 15 year tenure which is equivalent to offering a total of nine 4-credit upper-level courses with an enrollment of 6 students (the minimum number for running a course) each for free. The students have paid for these credits and the College has collected those tuition dollars, but the faculty member responsible for providing those 77 research experiences received no compensation in the form of course release, money or even recognition. There is no incentive for faculty who have achieved the rank of full professor to continue to provide these valuable experiences. The provision of undergraduate research experiences continues to be an equity and workload issue for Biology faculty.

*Table 12.4. Number of students enrolled in Independent Study (BIO 298 or 498) in Biology since 2005. Data source: Registrar's Office (personal communication, Tom Richards).*

Year	number of students	number of students	number of students <sup>1</sup>
	BIO 298	BIO 498	CHEM 498
2005	0	8	1
2006	0	6	
2007	1	13	

2008	3	16	1
2009	3	10	1

<sup>1</sup>CHEM 498 independent study projects are conducted with the permission of and in collaboration with the Chemistry department.

### *Reassigned Time and Workload*

Some Biology faculty have reassigned time to perform vital College functions. These have recently included: Departmental Chair reassigned time (2 courses per year), Assistant Dean reassigned time (2 courses per year), and Grant-writing reassigned time (1 course per year) and reassigned time paid for through federal grant money for the conduct of research (1 course per year).

### *Workload Issues of Note Since 2005*

In the past few years the general consensus amongst Biology faculty is that our workload is rapidly increasing. The major reasons for increased workload in the last few years are 1) faculty/staff flux, 2) Biology Program revision, 3) ISP Program implementation and assessment, 4) program assessment planning and work, and 5) time required to implement the new equipment and utilize the new space of the Science Center.

Our department has experienced significant flux in faculty and support staffing in recent years. In the last six years we have experienced four faculty losses (one retirement, one death, one resignation and one 0.5 faculty reassignment, see Table 12.5 for specific detail) and have conducted four searches. We will conduct a search in AY 09/10 to replace a colleague who died. With the recent loss of a half position to the Environmental Science Department, we are deeply concerned about any further losses.

*Table 12.5. Biology FTTT faculty changes since 1999*

<b>Time Interval</b>	<b>Number of FTTT<sup>1</sup> biologists</b>	<b>New hires</b>	<b>Departures<sup>2</sup></b>
1999/2000	6.5	M. Zhjera	D. Gregory <sup>2</sup>
2000 - 2001	7.5		
2001 - 2002	8.5	T. Zerucha	
2002 - 2003	8.5		M. Zhjera <sup>3</sup>
2003 - 2004	7.5		
2004 - 2005	8.5	K. Porter-Utley	T. Zerucha <sup>3</sup> B. Wise <sup>2</sup>
2005 - 2006	7.5	L. Launen	
2006 - 2007	7.5		
2007 - 2008	8.5	J. Kolodziejski	
2008 - 2009	7.5		J. Kolodziejski <sup>4</sup> , R. Gebauer <sup>5</sup>
2009 - 2010	7		

<sup>1</sup> FTTT = full time tenure track faculty positions.

<sup>2</sup> Departures due to retirement

<sup>3</sup> Departures due to resignation

<sup>4</sup> Departure due to death

<sup>5</sup> Departure due to reassignment to another department (the newly created Department of Environmental Studies).

The Department has also experienced considerable turnover in the part time lab preparatory support position, likely due to the basic nature of the position (requiring a sophisticated skill set but not offering full time pay or benefits). Thus we have had to hire a new lab preparator every year for the past four years. Hiring a lab preparator requires a yearly (in one case twice in one year) search as well as faculty time for job-specific training of the lab preparator. The lack of a consistent lab preparator has resulted in each faculty member having to perform hours of routine lab preparation and spend additional time on the maintenance of general supplies and equipment. While the faculty flux was unavoidable, the conversion of the lab preparator position to a full-time benefitted position would likely eliminate the turnover in lab preparatory we have recently endured and thereby reduce workloads considerably for Biology faculty.

In the last six years we have revised our Biology Program twice, on the second occasion this revision was the extensive conversion to a four credit model accompanied by a change to an integrated lab and lecture model described in Section 5. This required the re-design of every course offered in Biology, and most importantly, the re-design of laboratory activities to fit into the new time block model implemented College wide. This significantly increased the workload of all faculty in Biology, and support staff.

In the past three years Biology has participated in the development of the new campus-wide Integrated Studies Program which has included the designing and offering of new courses, as well as serving on committees and attending workshops to promote the development, implementation, and assessment of the ISP Program. Although, as discussed in Section 13, the insufficient number of Biology FTTT faculty has resulted in an increased reliance on non FTTT faculty (chiefly adjuncts) to teach many of these ISP courses, every member of Biology has taught at least one section of an ISP course per year since the ISP program began, continuing our tradition of supporting General Education at the College. Biology faculty have designed and implemented courses specifically for three of the four areas (discussed in Section 6) of this program in the past three years, including BIO 104 courses which contain a laboratory component and thus have extensive preparation workloads associated with them. While we embrace the new ISP Program is has increased our workload.

The new space of the Science Center, and the new equipment that has been placed in the Science Center as a result of grant writing activities and monies provided by the College, are a vast improvement on the prior decrepit Science facilities and equipment offerings. This change has resulted in a welcomed but not inconsiderable workload issue. Scientific equipment is not simple to select, purchase, implement or maintain. Keeping the laboratory environment in an adequate condition for the offering of courses and the conduct of research requires a few hours of work on the part of each faculty member in Biology on an almost weekly basis during the semester and typically during the summer as well if there are any research activities occurring. As written above, the conversion of the lab preparatory position to a full time benefitted position to include summer hours would significantly assist in this matter.

Although we generally feel that the members of our Department participate in professional development and scholarship (through research or in other manner) at a level appropriate to dedicated professional academic scientists, the general consensus amongst Biology faculty is that the increased workload discussed above is inhibiting the level of participation in professional development and scholarship to the level desired by most faculty members. For example, some faculty would like to engage in more active grant writing and be able to

supervise more students on the conduct of research projects, however the workload makes these activities very difficult to balance with excellence in pedagogy during the academic year. Increasingly, service activities such as serving on summer search committees for campus-wide positions, the NEASC process, ISP Program Development and the writing of this Program Review have demanded Biology faculty time during the summer. While the Biology faculty realize that we are technically free to refuse summer service, in the interests of good citizenship this is not always possible and thus even our non-contract and thus unpaid time is increasingly burdened in a manner that reduces our availability for professional development and scholarship. We feel that the College could improve this situation if the work of maintaining the infrastructure required for science education (such as equipment maintenance, grant writing etc.) was formally recognized as a service of benefit to the College and thereby counted towards promotion and tenure, if we had increased lab preparator support and if we received workload credit for teaching independent study.

### **SECTION 13. ADJUNCT AND OTHER NON-TENURE –TRACK FACULTY (NON FTTT FACULTY)**

#### *OVERALL ADJUNCT RELIANCE*

As of Fall 2008 non FTTT faculty (Adjuncts and contract lecturers for the purpose of this report) taught 59% of the student credit hours for all Biology courses. Figure 13.1 depicts the percent of student credit hours taught by either FTTT or non-FTTT from 2001 to 2008. This figure clearly depicts a trend towards increasing reliance on non-FTTT. Table 13.1 describes how many sections and what courses are taught by non FTTT faculty based on the academic year 2008/2009 as representative data. While the trend towards increasing reliance on adjuncts is alarming and is occurring College-wide (see NEASC report, [insert link](#)), it should be noted that course reassignments and adverse personal circumstance have contributed to this trend in Biology. In the past two years course reassignments for serving as Departmental Chair (2 courses per year), Assistant Dean (2 courses per year), and for writing grants and conducting research (1 per year) have reduced the availability of FTTT to teach as they are performing other vital College and Departmental functions. Furthermore, Dr. Johanna Kolodziejski, who was hired in 2007, was only able to teach for one year prior to her illness and death. Dr. Renate Gebauer, who was a half-time Biology faculty member, has been permanently reassigned to the new Environmental Studies Department, which further reduces the number of available Biology FTTT.

Of the 74 sections of Biology courses taught in 2008/2009 49% (36/74) were taught by non FTTT faculty. The greatest share of these was taught by Dr. Doug Smith who taught 16 sections of Anatomy and Physiology (I and II) in 2008/2009, representing 22% of all sections for all Biology courses taught in that academic year. Of the 36 sections taught by non FTTT 35 (97%) were lower-division courses.

In 2008/2009 25 sections of ISP-specific (Perspectives) courses were taught. Of these 25 courses, 18 (72%) were taught by non FTTT faculty. Academic Affairs statistics show that adjuncts taught 74% of all IS course sections in Spring, 2009 (NEASC, Standard 5 Report), thus reliance on adjuncts to teach most of the workload for ISP courses appears to be a College-wise problem and not one limited to Biology. All of these sections were for INBIO 101, a “Perspectives” lecture only course. Biology offered one upper level course in the Spring semester of 2009 taught by Dr. Todd Jarry, a contract lecturer in the Department. Dr. Jarry is a highly qualified Ph.D level medical microbiologist with post-doctoral training and was able to offer students a unique perspective in the field of medical microbiology not otherwise available to them with the FTTT faculty in the Department.



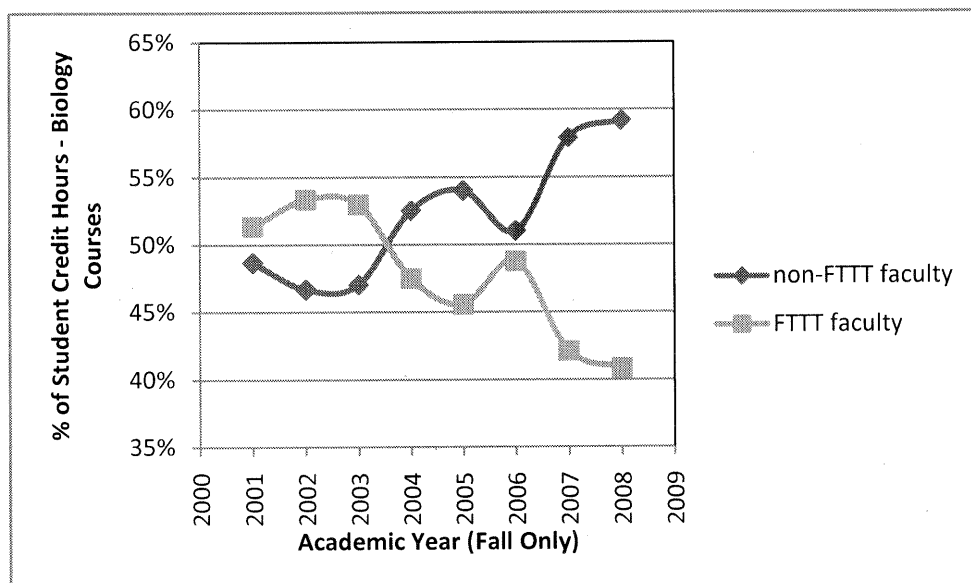


Figure 13.1. Student credit hours taught by Biology faculty in the Fall semester from 2000 to 2008. FTTT are full time tenure track faculty and non-FTTT faculty include adjuncts, contract lecturers, PATs and other non tenure track faculty.

Table 13.1. Adjunct and Non-Tenure Track Biology Faculty Description (2008/2009)

Faculty	Status	Terminal Degree	Courses Typically Taught	Total Sections
Dr. Douglas Smith	Professional and Technical Staff	Ph. D	Anatomy and Physiology I (BIO 232), Fall – 8 sections, Anatomy and Physiology II (BIO 230), Spring – 8 sections	16
Dr. Todd Jarry	Contract Lecturer	Ph.D. Molecular and Cellular Biology	Cell and Microbial Biology (BIO 240), Spring, 2 sections Fundamental Topics in Microbiology (BIO 490), Spring, 1 section	3 (Spring 09 only)
Dr. Sue Piscopo	Adjunct	Ph.D/DVM (Ph.D in Physiology & Toxicology)	Cells and Molecules (BIO 110), Fall-2 sections, Cells and Physiology (BIO 210), Spring- 1 section, Evolution (BIO 111), Spring – 2 sections	5
Mr. Clifford Lerner	Adjunct	M.S. Environmental Science	Tropical Biology (INBIO 101), Fall-1 section, Spring – 1 section	2
Ms. Julia Imbarrato	Adjunct	M.A. Science Education	New Perspectives in Biology (INBIO 101), Fall -1 section, Spring – 1 section	2
Dr. Nancy McDade	Adjunct	Ph.D. Exercise Physiology	Intro to Human Physiology (INBIO 101), Fall 1 section, Spring – 1 section	2
Ms. Carolyn Wheeler	Adjunct		Plant Diseases (INBIO 101), Fall-3 sections, Spring- 2 sections	5
Mr. David Lee Chesemore	Adjunct		Ecology and Environmental Issues (INBIO 101), Fall- 1 section	1 (Fall 08 only)
			Total	36

In recent semesters, the Department typically relies upon the work of 5 adjuncts (Piscopo, Lerner, Wheeler, McDade and Imbarrato) and one PAT (Smith) and one contract lecturer (Jarry). Table 13.1 describes the degree qualifications, the courses typically taught by these faculty, and the semester and number of sections for each based on 2008/2009 data. The Department determines the need for adjunct faculty during Departmental meetings (attended by FTTT faculty of the Biology Department only) as part of the scheduling discussions that occur each semester. The Chair of the Department is typically responsible for working with the Dean and Human Resources to develop a job ad seeking the adjunct faculty, and for interviewing and hiring candidates.

Of these seven non FTTT faculty 4 belong to the KSC Adjunct's Association (KSCAA), 1 is not yet eligible as she has not taught sufficient semesters, Todd Jarry is eligible to join the KSCEA instead as he is a contract lecturer, and Doug Smith is not eligible to join either union as he is a PAT. Adjuncts who are in the KSCAA are covered by the terms of its collective bargaining agreement which determines their pay scale. This is outlined at: [http://www.usnh.edu/hr/LaborRelations/pdf/KSCAACContract2005\\_2009.pdf](http://www.usnh.edu/hr/LaborRelations/pdf/KSCAACContract2005_2009.pdf); in Article 12. For those faculty not covered by the KSCAA collective bargaining agreement the President's Cabinet is responsible for determining compensation [personal communication, Provost, Mel Netzheimer).

Dr. Douglas Smith is currently in a term position with benefits that is classified as Professional, Administrative and Technical (PAT). The position is reappointed yearly. Dr. Smith taught as an adjunct initially but was converted to a PAT in 2007 in recognition of his excellent service and because of the high teaching load he carries in the Biology Department.

Dr. Todd Jarry has been hired into a one-year full-time position for the Academic Year 2009-2010 as a Lecturer-Contract Faculty. Since this is a one-year appointment Provost Netzhammer hired him on the recommendation of Dean Leversee, and his hiring was solicited by the Biology Department as we were familiar with his work (he had worked as an adjunct for us in the 2008/2009 academic year). The employment policy governing this type of position can be found at <http://usnholpm.unh.edu/USY/V.Pers/C.6.htm>, specifically item 6.2.15 (personal communication, Heather McGreer, Human Resources, KSC).

When conducted, evaluation of non FTTT faculty is conducted in agreement with the description in the KSC Adjunct Association (KSCAA) collective bargaining agreement for adjuncts, even in the event that the faculty is not technically an adjunct but rather a PAT (as for Dr. Douglas Smith) or a contract lecturer (as for Dr. Todd Jarry). The KSCAA collective bargaining agreement is online at: [http://www.usnh.edu/hr/LaborRelations/pdf/KSCAACContract2005\\_2009.pdf](http://www.usnh.edu/hr/LaborRelations/pdf/KSCAACContract2005_2009.pdf); see Article 11. There are in fact more restrictions on the ability to evaluate adjuncts imposed by the KSCAA collective bargaining agreement (for example, other than in the 8th and 16th semester the Departmental Chair and his/her designee can only request to observe a class if there are concerns about performance, rather than as a routine evaluation procedure) than on the observation of FTTT faculty members (as outlined in the KSCEA Collective Bargaining Agreement, Article VIII, see <http://www.keene.edu/admin/facultycontract.cfm>). The chair reviews all student evaluation forms from non-FTTT faculty at the end of the semester, and has occasional conversations about the functioning of the course during the semester with each non-FTTT faculty member. The chair also provides advice to non-FTTT faculty who seek help with particular issues or general needs. In practice, however, the combination of the restrictions on adjunct evaluation imposed by the Collective Bargaining Agreement, and the heavy workload of the Chair and other faculty members, have resulted in very infrequent evaluation of adjuncts in the Biology Department.

## SECTION 14: STUDENTS

### STUDENT DEMOGRAPHICS

Demographic data obtained from Institutional Research (see the Appendices for the raw data provided) taken from Fall semesters from 1999 to 2008 indicates that the ethnic diversity of matriculated students in the Biology Program is typical of that of the entire College (see “Factbooks” available at <http://www.keene.edu/ir/> for all data and Table 14.1 below for comparison with the “% White” category) and is dominated by “White” students who typically represent 90% of the students enrolled in the Biology Program. Institutional Research uses the following categories to describe ethnicity: A-American Indian, B-African American, C-Asian American, D-Hispanic American, E-White, F-Non-Resident Alien, G-Resident Alien, I-Mixed Race, O-Other, N or Blank-Non-Respondent. (pers. comm. Cristi Carson, Institutional Research of KSC), thus “White” indicates that the nationality is American. The data are summarized in table 14.1 below. It should be noted that data on ethnicity are based on self-reporting which results in some variability that does not necessarily reflect the actual demographic of the students in the Program (and at the College).

*Table 14.1. Ethnicity of Students Enrolled in the Biology Program. Data source: Institutional Research (Biology specific) and KSC Factbooks (College-Wide data, <http://www.keene.edu/ir/>).*

Ethnicity <sup>1</sup>	Year <sup>2</sup>									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
A	0	0	2	2	1	1	2	1	0	0
B	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	1	0
D	1	0	1	1	2	2		1	1	1
E	55	42	49	31	52	45	57	56	64	72
F	0	0	0	0	2	0	0	1	1	1
G	1	0	0	0	0	0	1	0	0	0
I	0	0	0	0	1	1	1	3	2	1
O	0	1	0	1	1	1	1	0	0	0
N/Blank	2	1	3	4	2	1	1	1		1
Total	59	44	55	39	61	51	63	63	69	78
% White	93	95	89	79	85	88	90	89	93	92
% White – KSC <sup>3</sup>	91	92	92	92	90	90	90	89	90	91

<sup>1</sup> Letters denote ethnicity as defined by KSC Institutional Research, in text above.

<sup>2</sup> Biology data is Fall only, KSC – all data (last row only) is from the entire year as in the KSC “Factbooks” at <http://www.keene.edu/ir/>.

<sup>3</sup> This category is called White/non-Hispanic in some years but always refers to Americans with regard to nationality. This data is for the entire year, not only fall semester.

Using the same raw data provided by Institutional Research as well as data available in the KSC “Factbooks” (link above), the distribution of students in the Biology Program according to gender was determined and is shown in Table 14.2. The students in the Biology Program are mainly female, with males only representing an average of 39% of the students in the years 1999 – 2008. This number has remained relatively constant in the past 10 years (since the last Program review in 1999) and is similar to that of the entire College (see last row of Table 14.2).

Table 14.2 Gender of Students Enrolled in the Biology Program. Data source: Institutional Research (Biology specific) and KSC Factbooks (College-Wide data, <http://www.keene.edu/ir/>).

Gender	Year <sup>1</sup>									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Female - Bio	33	31	35	23	42	27	37	41	39	47
Male - Bio	26	13	20	16	19	24	26	22	30	31
Total - Bio	59	44	55	39	61	51	63	63	69	78
% Male - Bio	44	30	36	41	31	47	41	35	43	40
% Male – KSC1	43	43	43	42	43	42	43	42	42	43

<sup>1</sup> Biology data is Fall only, KSC – all data (last row only) is from the entire year as in the KSC “Factbooks” at <http://www.keene.edu/ir/>).

The distribution of students according to age in the Biology Program is depicted in Table 14.3. Most students in the Biology Program are less than 25 years of age (88% as of 2008). This number has fluctuated between 77% (2002) and 90% (2006) in the past 10 years but typically tends to be somewhat lower than the College wide student demographic which is typically above 90% (as shown in the last row of Table 14.3).

Table 14.3. Age distribution of students enrolled in the Biology Program. Data source: Institutional Research (Biology specific) and KSC Factbooks (College-Wide data, <http://www.keene.edu/ir/>).

Age Category	Year <sup>1</sup>									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
17-24 - Bio	46	37	45	30	53	44	53	57	61	69
25-34 - Bio	9	5	6	6	3	3	5	4	6	8
35+ - Bio	3	2	4	3	5	4	5	2	2	1
Unknown - Bio	1	0	0	0	0	0	0	0	0	0
Total - Bio	59	44	55	39	61	51	63	63	69	78
% Under 25- Bio	78	84	82	77	87	86	84	90	88	88
% Under 25 - KSC Undergrads	90	91	92	93	84	93	94	94	95	96

<sup>1</sup> Biology data is Fall only, KSC – all data (last row only) is from the entire year as in the KSC “Factbooks” at <http://www.keene.edu/ir/>).

The College maintains home addresses for all students in the “Datatel” database system. This information is used to generate data on the “home states” for students. It should be noted, that if non-resident aliens (category F, as in Table 14.1 and text above) list an address that is within the US, then that will be considered the “home state”, therefore the utility and accuracy of this information is questionable, nonetheless, it is used in evaluating student demographics at KSC and was the source of information provided for the writing of this report. Using this information, the distribution of Biology student’s home states are depicted in Table 14.4. Most of the students in the program provide an address within the state of New Hampshire. The second most common home state is Connecticut. The majority of students list states within the New England region. This is comparable to similar data included in the KSC Factbooks (link above) for the entire College student population.

Table 14.4. Home state for Biology students in the Fall semester. Data source: Institutional Research via Datatel.

Home State	Year (Fall)									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CT	7	5	9	6	11	8	9	9	9	11
FL	0	0	0	0	1	0	0	0	0	0
GA	0	0	0	0	0	0	1	0	0	0
MA	6	5	6	2	4	1	3	4	9	8
ME	1	1	1	1	2	1	0	0	0	0
NC	0	0	0	0	1		1	1	0	0
NH	37	27	35	27	37	34	43	42	43	52
NJ	1	1	0	0	0	0	2	1	1	0
NY	0	0	0	0	2	2	1	1	3	4
RI	3	2	2	1	0	2	1	0	0	0
VA	0	0	1	0	0	0	0	0	0	0
VT	4	3	1	2	3	3	2	3	3	3
WA	0	0	0	0	0	0	0	0	1	0
Grand Total	59	44	55	39	61	51	63	63	69	78

#### OPPORTUNITIES FOR STUDENTS TO PARTICIPATE IN THE PROGRAM

As with all students at KSC, Biology students participate in course evaluations. All professors within the Biology Program give course evaluations at the end of each semester, typically within the last week of classes. These evaluations are used to measure the teaching effectiveness of the faculty in the promotion and tenure process in accordance with the policies outlined in the KSC Employee Association Collective Bargaining Agreement and the Faculty Handbook (both available on the College webpage). Faculty use course evaluations to consider how best to improve their courses with regards to content and delivery. Biology faculty take student evaluations very seriously and routinely discuss them with one another for the purposes of curricular improvement.

In addition to student evaluations of all courses, all students in the BS program participate in the Senior Seminar course within the fall of their senior year. The content of this capstone course varies (and is discussed in section 5 and 8) but always includes a focus on career preparation and the conduct of an assessment exam (discussed in section 10). The results of this exam are considered by the Biology faculty in discussions about what the content of core courses should be, and how the Program can best be modified, thereby providing students a means of impacting program design.

Students participate in a variety of way in the Biology Department's routine and occasional activities. One important means by which students participate in the Department is to assist in the evaluation of candidates for faculty positions in Biology. Students are asked to attend presentations by candidates who have been brought to campus for interviews. Students complete written evaluations of these presentations and these evaluations are then considered when the Department makes decisions regarding the appropriateness of candidates for the positions. Students attend seminars by visiting scientists organized by the Biology Department. Students also participate in appropriate manner in the delivery of courses by working, in some cases, as lab preparators and teaching assistants.

Graduating seniors of KSC all participate in a Senior Survey prepared and administered by Institutional Review. The survey information is sent to students along with the participation form they must complete in order to attend commencement. They are asked to complete the survey in the month prior to commencement. The survey is completed electronically and the results compiled by Institutional Research who posts summaries of these results on the College website. In addition to standardized questions such as “Overall, how satisfied are you with your Keene State College education?” which are completed by selecting from a multiple choice-style menu of options, the Senior Survey sometimes (approximately every other year) asks students open-ended questions that give them the opportunity to say what they would like to see changed at KSC. Student comments are then organized by program and the comments analyzed by Institutional Research. The Keene State College Graduating Senior Survey is available online at <http://www.keene.edu/ir/>. Unfortunately the Biology Department has not traditionally used the information from these surveys in program revision as the information tends to be relatively non-specific and difficult to apply. As discussed previously, we would like the College to help us develop and implement a post-graduation survey to specifically assess the effectiveness of our program in preparing students for post-graduation career activities.

#### *STUDENT CLUBS/ACTIVITIES*

The Biology students organize and run a “Biology Club” which includes both Biology and non-Biology students interested in gathering for social and academic purposes. The major focus of the club is to organize and secure funds for an annual two week trip to a different geographical region of the United States each year. One member of the Biology faculty serves as the faculty advisor for the club each year, and often attends the trip. This trip provides many of our students the opportunity to visit a new area of the US that they would not otherwise have, thereby broadening their educational experience. Other club activities include the organization of talks from visiting scientists from time to time.

In addition to the Biology club there is a chapter of Beta Beta Beta (TriBeta), an academic society for undergraduate biology students aimed at improving the understanding and appreciation of biological study and extending boundaries of human knowledge through scientific research. Entrance to the society is limited to students with a GPA of 3.0. A biology faculty member serves as the advisor for the KSC Tri-Beta group. This group has not been highly active in recent years due primarily to lack of student involvement and motivation, however in the past year the chapter has been “resurrected” and several students have expressed interest in organizing activities in the year to come. Connecting research activities, which are expanding within the Biology Department, to Tri-Beta may serve as a means of facilitating a more vital Tri-Beta organization at KSC, and thereby further enriching the Biology student’s academic environment. For example, students conducting research could present their work at the regional Tri-Beta conference in future.

#### *ALUMNI*

The Biology Program does not have a formal method for maintaining contact with alumni of the Program, nor for evaluating their success upon graduation. However, because our program fosters close mentoring relations with all students in the major, faculty often maintain contact with alumni and are frequently called upon to provide references for students who are applying for career opportunities including graduate school, industry and government positions after graduation. In recent years, we have begun to compile a “Wall of Fame” where copies of letters of admission into graduate programs and offers of employment in the Sciences are posted. While not a formal process, this practice, which was initiated by Dr. Johanna Kolodziejski, represents a method

whereby we are able to “keep track” of at least some of our graduating seniors and measure their immediate career successes.

The anecdotal nature of our contact with alumni is problematic and the Biology faculty would like to have assistance from the College in constructing and implementing a post graduation survey tool to better evaluate the ability of the Biology Program to prepare graduates for their subsequent careers.

## **SECTION 15: RESOURCES: OUR PROGRAM’S EQUIPMENT AND TECHNOLOGY NEEDS AND RESOURCES:**

Science has changed dramatically in the past decade with the advent of new technology and the accompanying information gained through the application of that technology. Accordingly, the standards for excellence in the teaching of science have changed over the last decade. The Biology Department has whole-heartedly embraced these advances in science education and has organized the acquisition of new equipment, its implementation into research and teaching, and the creative integration of laboratory work into almost all of our courses to more effectively teach the practice of science and not simply the theory.

### *PHYSICAL SPACE*

We designed our space in the new Science Center specifically to facilitate our efforts to improve the teaching and learning of biology. The Biology space includes five lecture/lab spaces fully equipped for laboratory and lecture-style teaching including bench space, appropriate and comfortable student seating, sinks, access to chemical fumehoods and biological safety cabinets, gas and appropriate safety infrastructure such as emergency eyewash stations and showers. These teaching spaces include “Smart Cart” technology allowing professors to use powerpoint and other computer technology to best present information. These teaching spaces hold from 16 to 24 students ensuring small class sizes are maintained and maximizing student/professor interaction. One of these spaces (SCIC 351) was designed specifically by the Biology department to support our INBIO 104 classes, integrated lab/lecture courses for nonmajors. Additional physical facilities that are important to the Biology Program include a three shared research spaces, two common prep rooms, a greenhouse and a herbarium. The three shared research spaces support undergraduate research efforts, while the common prep rooms house our chemical inventory, shared storage and equipment, autoclave, fume hood, and dishwasher in support of both teaching and research.

The primary mission of the Keene State College Herbarium is to house correctly identified scientific specimens of the New Hampshire Flora, which includes mainly vascular plants (ferns and their relatives, conifers, and flowering plants). Toward this mission the specimens are maintained in good condition, arranged in an orderly fashion, and accessible to the public. The herbarium is also an important research and teaching facility. The KSC Biology Greenhouse is an 800 square foot Lord and Burnham greenhouse which houses a small teaching collection and provides space for plants for research projects. The plant collection is used for teaching Evolution, Plant Physiology and Ecology, Plant Evolution and other courses. Plants for research projects, chiefly Passiflora for an NSF funded research program, are maintained in the greenhouse.

We have lost adjunct office space over the past two years and now have several adjunct faculty housed in a FTTT faculty office that is presently vacated but will be occupied next year. We are also in need of a IACUC-approved facility for housing vertebrates (adult frogs). The increasing use of some of our laboratory classrooms (e.g. SCI 351) for non-laboratory classes offered by other departments has become an issue.

## *EQUIPMENT*

Our teaching spaces contain state of the art equipment and accompanying supportive technology. For example, in 2008 the College provided almost \$250 000 in funding through the Strategic Initiatives program in response to the Biology Department's request for monies to purchase sufficient microscopes and dissecting scopes, and supportive imaging technology (digital cameras and video cameras) to equip every lab. Each of our five teaching spaces is now equipped with enough microscopes and dissecting scopes, all state of the art and of high enough quality for basic research and teaching, for each student in a fully enrolled section to use their own individual equipment. To possess so much high quality imaging technology is rare at any college or university in the nation and is a reflection of the commitment of the Biology Program and the College towards fully implementing a high quality science education program in Biology.

With regards to other equipment the Biology program possesses equipment for analysis of DNA/RNA and protein, chemical analysis, and the maintenance and study of many types of living organisms including microbes, plants, invertebrates and some vertebrates (see below). Our equipment for DNA and RNA-based molecular analysis includes two "standard" polymerase chain reaction (PCR) machines, one quantitative real time PCR, two DNA sequencers, one DNA microarray apparatus, several DNA/RNA/protein gel rigs and supportive UV imaging boxes, and adequate high quality mechanical pipettors to allow students to pursue studies of molecular biology at the lower and upper undergraduate level with ease. Further analytical equipment in the form of a Gas chromatograph – mass spectrometer, high performance liquid chromatograph, atomic absorption spectrometer, standard UV spectrometers and fluorescent microscope are located in either the Biology or Chemistry Department, available to all Biology faculty for integration into their courses and research. In addition to this highly sophisticated and expensive equipment the Biology Program owns several incubators, aquaria, shakers, balances, pH meters and other routine laboratory equipment and are well equipped with standard facilities for preparing chemical solutions, sterilizing equipment and solutions (the autoclave), obtaining high purity water (the Millipore water apparatus), and a full inventory of appropriate glassware for conducting science.

## *TECHNICAL SUPPORT STAFF*

The Biology department is currently staffed by two Lab technicians, one of which (the senior lab technician, Ms. Katie Featherston) is a Professional, Administrative and Technical position at 75% of full time, the other (Ms. Kathy Beltz) is an ancillary position working approximately 35 hours per week during the Academic year. The senior lab technician position is responsible for all purchasing and budget management for the department, set-up and clean-up of all labs, supervising student workers and managing the Biology Greenhouse. The ancillary position is responsible for maintaining the chemical and supply inventory and assisting with lab preparation and clean up.

The Biology Department relies on student assistance for some lab preparatory needs (through work study and the use of students as Teaching Assistants). The growth of hands-on science education in the Biology Program has resulted in increased demands on faculty and staff and the Department envisions the need for the conversion of at least one of these positions to a full time position. Further discussion on the need for support staff availability with regards to information technology is below.

## *ADMINISTRATIVE SUPPORT STAFF*



The Biology department is supported by three administrative support staff, Ms. Marianne O'Brien (administrative assistant to the Dean, full time), and two part time administrative support staff coordinated by Ms. O'Brien. Ms. O'Brien assists the Biology department with scheduling, budgeting and general coordination of countless department activities. All members of the department find Ms. O'Brien to be an indispensable, highly competent staff person that is a tremendous asset to our Department, Program and the School. Unfortunately, the staff supporting Ms. O'Brien are not effective and lack basic skills necessary for administrative assistants, for example, skills such as basic word processing abilities or ability to effectively process time sheets for student workers. These inadequacies are difficult to deal with given that these staff members do not report directly to Marianne O'Brien (instead they report directly to the Dean). We feel this reporting structure should be remedied so that the staff members report to the person in charge of their activities (Ms. O'Brien) which would better enable Ms. O'Brien to ensure that these staff members either gain the skills and other limiting characters required to do their jobs effectively, or be replaced with staff willing to do so. This would improve the overall efficiency of operating not just the Biology program, but all programs in the School.

### *BUDGET*

Typically, the Biology budget allocates approximately \$30 000 per year to support direct laboratory costs for courses, to maintain the greenhouse and herbarium, to conduct independent study coursework with students and to maintain the general supplies necessary for a lab-dense Program (such as safety supplies and routine chemicals). This is allocated to specific courses at the beginning of the year. In addition, approximately \$12 000 per year is allocated for equipment purchase and \$2000 per year for equipment maintenance. Other monies are allocated for printing, telecommunication costs and minor routine costs associated with running the Program.

In recent years the Biology Department has had to solicit increased money for course supplies. For example, in both 2007/2008 and 2008/2009 the budget originally consisted of approximately \$20 000 for course supplies and it was necessary to obtain an additional amount of approximately \$10 000 each year. There are several reasons for this increased monetary demand. Firstly, supply costs have increased significantly in the past three years, particularly the costs of shipping, plastics and any other disposable product that relies on the petrochemical industry. Secondly, the availability of better space and physical equipment, and the subsequent re-design of courses to improve the quality and quantity of hands-on science education, has resulted in the use of more supplies. We consider this the cost of running a high quality program and are committed to continuing to pursue an expanded course budget so that we can better educate students and fully utilize our state of the art facility and equipment. While the purchase of the imaging technology described above has relieved us of the necessity of dedicating most of the \$12 000 in equipment money to the purchase of new microscopes and dissecting scopes, that money is still inadequate to replace equipment that needs to be retired such as older incubators that have a relatively short lifespan and are heavily used, glassware which needs continual replenishment, and smaller equipment such as manual pipettors which students, as part of the normal learning process, wear out quickly. The Department would also like money to pay for field trips for students and for additional funding for equipment maintenance and continued education/training for faculty on some of the newer, state of the art equipment.

### *SUPPORTING PROGRAMS AND OTHER COLLEGE SERVICES*

#### *Informational Technology*

The Information Technology Group at KSC provides a wide range of technology service and support used in the implementation of the Biology Program. The IT Group is responsible for our technology infrastructure which includes telecommunications services and network support. Two particularly vital functions IT performs are the maintenance of Blackboard and the Help Desk. The Biology Program relies on the use of Blackboard in all its courses; all faculty in Biology disseminate information via Blackboard and use it as a powerful course management tool.

The HelpDesk provides assistance with computing, network, hardware, software, and telecommunications problems and questions. This group is probably one of the most critical groups for supporting the Biology Program (and all Programs at KSC) as we rely heavily on them to maintain faculty computers, networking and to assist with the use of information technology in the classroom. No other service on campus (with the exception of Environmental Health and Safety) is called upon to assist with “classroom emergencies” that directly impact the student experience (such as the inability to project a powerpoint slide show to augment a lecture, or to project images from the microscope for classroom discussion). The Biology Department has noticed that while the numbers of student, faculty and administrators have grown in the last few years, there is no accompanying growth of staff available at the Help Desk. If this trend continues we envision a reduction in a vital service which will adversely affect our ability to run our Program.

A problem related to IT that impacts the Biology Program is the blending of computers associated with existing laboratory equipment into the IT network. Typically, when scientific equipment is purchased, it comes with a computer that has the appropriate software on it. This computer is not ordered/installed through IT, and thus is not subject to maintenance or networking by our IT staff. This is problematic. For example, this has posed a problem for the implementation is in the use of a very sophisticated UV-Vis Spectrophotometer in Biology. This equipment is associated with an older computer that arrived when the equipment was purchased and is not supported by IT, and thus not networked. Because we cannot get the computer networked students and faculty cannot print or transfer electronic files from the equipment for analysis and presentation. This renders this excellent piece of equipment almost unusable in a modern educational environment. Increased flexibility and support with regards to our information technology needs are required to work around these issues and implement our Program to its full potential.

### *Environmental Health and Safety*

The Keene State College Office of Environmental Health and Safety (EHS) assists us with the work of providing a safe and healthy working environment for students, staff and faculty of the Biology Program. EHS is responsible for hazardous materials and environmental management; occupational health; general safety; illness and injury prevention; industrial hygiene; and other technical areas, as outlined in the USNH Policy on Environmental Health & Safety and describes at: <http://www.keene.edu/ehs/>. EHS, with the help of a committee of faculty and staff in the Natural Sciences compiled a “Chemical and Biological Safety Procedures for the School of Sciences and Social Sciences” (online at the link above) which details procedures for hazardous waste spills and disposal, correct use of safety equipment such as chemical fumehoods, and requirements for training of students in the laboratory. This is a vital service to the Biology Program implemented in 2008/2009.

Importantly, as indicated in the “procedures” we are required by law to have a Chemical Hygiene Officer, a position that is currently unfilled. As our EHS group consists of only one individual who is responsible for EHS campus-wide, the lack of a Chemical Hygiene Officer compromises our ability to maintain a safe environment

for students, staff and faculty and thereby compromises the Biology Program. We hope that the College will work to create this vital position as they continue to support the sciences.

### *Institutional Animal Care and Use Committee (IACUC)*

The Institutional Animal Care and Use Committee (IACUC) is a self-regulating entity that, according to U.S. federal law, must be established by institutions that use laboratory animals for research or instructional purposes to oversee and evaluate all aspects of the institution's animal care and use program. Keene State College is such an institute as the Biology Program conducts research with amphibians. Currently, we do not have a federally approved IACUC although we have a nascent IACUC committee that includes two Biology faculty members and the Director of the Office of Sponsored Projects. In order to conduct research, and to apply for Federal grants, we are now in the position where we have to rely on nearby institutions (USNH and more currently Dartmouth College) to provide their IACUC to oversee our use of animals. This situation is inefficient and unethical in that we are not properly modeling the appropriate compliance with Federal requirements by failing to develop a viable Federally approved IACUC here at KSC. This process must be driven by the College leaders. The Biology Department hopes that the appropriate College leadership will increase its efforts to support the development of a viable IACUC here at KSC as the lack of one is currently hindering the Biology Program's ability to secure federal funding, conduct research and implement more use of amphibians in our curriculum.

### *Mason Library*

The Mason Library provides resources and instruction in support of the Biology Program. The library holdings number about 326,000 items and annual publications; subscriptions to more than 900 print periodicals and newspapers and an extensive selection of videos, DVDs, audio books, and music CDs. The Cohen Center for Holocaust Studies, Curriculum Materials Library and Orang Asli Archives as well as other collections are located in the library. One of the most important resources used by the Biology Program are the online databases such as Biological Abstracts, Agricola, and the Web of Knowledge which tabulate scientific information published in peer reviewed journals, typically the library resource of most importance in science education. Off-campus access to these services is provided to patrons with a library-validated KSC student or faculty ID. While the library subscribes to relatively few journals in the sciences as compared to a larger institution, access to a much larger collection is available through the services of interlibrary loan. All Biology faculty agree that the lack of online access to Nature, Science and the Proceedings of the National Academy of Sciences (the three preeminent journals in science) are significant limiters to the ability of the Biology Program to support high quality science education. Biology faculty also find that while interlibrary loan is generally effective and the staff are highly qualified and supportive, the quality of the article received is often so poor as to render it unhelpful. Given the relatively remote location of Keene State College these are significant concerns.

### *Office of Sponsored Projects and Research*

The mission of the OSPR is to provide high quality support for faculty and staff interested in seeking grant funding for research, training, service and other projects. This includes assistance in all phases of pre-award grant activity: identifying funding opportunities, proposal development and submission, and negotiation/acceptance of awards. Working closely with the Business Office, OSPR also provides assistance and support for post-award issues. The Director, Dr. Penny Miceli, has been instrumental in facilitating recent

grant efforts in the Department. Dr. Miceli is a Certified Research Administrator (CRA), a distinction bestowed by the Research Administrators Certification Council, after candidates meet their minimum requirements in terms of experience in the field of research administration, and then by mastering the “body of knowledge” and passing a standardized exam. Re-certification is then required every 5 years. We are fortunate to have such a highly qualified Director at OSPR and look forward to working with Dr. Miceli in furthering our ability to obtain external grants to support our Program.

### *Center for Writing*

The Center for Writing, provides support for students and faculty to promote effective writing and thinking by offering a variety of services. These services include peer tutoring for students, and The Calderwood Institute on the Teaching of Writing for faculty. This Institute immerses participants in current research on composition studies, cognitive developmental theory, and the relationship between thinking, writing, and learning with the goal of supporting faculty to be better teachers of writing. Two of the Biology faculty have participated in the Calderwood Institute and both of those faculty have translated their experience into the implementation of ITW (Thinking and Writing) courses for the College ISP program.

### *Math Center*

The Math Center administers math competency tests and quizzes for faculty members, as well as proficiency and assessment testing for individual courses. Although none of the Biology courses directly require such assistance, the students participating in the Biology BA and BS are required to take chemistry and physics courses which require proficiency in mathematics and for these courses the responsible faculty rely on the math center for assessment and tutoring of students. Students weak in mathematics are able to obtain tutoring at the Math center. In addition, the Math center provides review sessions for the Praxis exams that are a component of the Education program. Anecdotal reports from Biology students indicate that the Math center provides excellent support of our students although we have not systematically collected data to verify this statement.

### *Aspire*

The Aspire program is a federally funded program which provides students with academic support services designed to enhance success. This program is available to students who are 1) first generation College students, 2) some low-income students receiving financial aid and 3) students who have a documented learning and/or physical disability. Aspire will encourage students to take full advantage of the services available at Keene State. They also assist students in examining their strengths and limitations in order to create a realistic schedule of classes. The program attempts to help students improve their performance in classes, and increase the likelihood that students will graduate. Aspire offers individualized peer tutoring, study skills workshops, study skills handouts, academic advising, financial aid advising, one on one educational counseling, and access to a small computer lab and other support services. As some of the students enrolled in the Biology degree programs, and students taking Biology courses generally speaking, require these services, the Biology Program relies on the work of ASPIRE to successfully operate. All biology course syllabi typically include text describing the ASPIRE program and Biology faculty work to help direct students in need of the services of ASPIRE to that office in a timely fashion. Biology faculty also work with ASPIRE when students with identified learning or physical disabilities require extra support, for example, when a student requires the provision of a separate space and extended time for the conduct of examinations Biology faculty will typically enlist the support and services of ASPIRE.

### *Continuing Education*

The Continuing Education office coordinates access of non-matriculated students to KSC courses, managing enrollment and tuition, and coordinating the access of these students to KSC facilities and services. Although most students in the Biology BA and BS degree programs are matriculated students (see Section 14 for a description of students enrolled in the Biology degree programs) from time to time students enrolled in our classes, both those for majors and non-majors are enrolled through the Continuing Education program.

### *Academic and Career Advising*

It is the mission of the Academic and Career Advising department (ACA) to support students in the transition to Keene State College, in the clarification of academic focus and major, and in the successful translation of their academic credentials as preparation for life after the college experience. ACA works with the Biology Program to ensure that students are receiving appropriate advising in their academic programs (see Section 11), and that students have access to support services for career preparation. While the Biology Program performs its own one-on-one academic advising for all majors and any minor students who request it, questions regarding how transfer credits apply to degree requirements, how military experience may translate to credit and other areas are typically answered by the collaboration of ACA and Biology faculty on a case by case basis. Biology faculty also work closely with ACA to ensure that incoming freshman students receive appropriate information regarding the first semester's coursework and thus do not get "behind" in their pursuit of a Biology degree which requires a sequential approach (see section 5).

### *International Education*

The National and International Exchange Office provides support to students studying away as well as to international students studying here at Keene State College. The Office coordinates the "study away" program, granting admission to the program, coordinating tuitions and fees, and helping to ensure that students earn credit relevant to their degree requirements while participating in the program. In order to accomplish this for Biology majors, the Office typically works with the student involved, and their Biology faculty advisor to compare appropriate courses at the selected institution away with the Biology curriculum. This is conducted on a case by case personalized basis.

### *The Center for Engagement, Learning and Teaching (CELT)*

The Center for Engagement, Learning and Teaching is a newly created center aimed at providing resources and experience to support deeper learning, effective teaching, and community and professional engagement at Keene State College. Functions CELT will now be coordinating include academic technology, new faculty orientation and hosting/organizing Teaching Excellence Week in the spring of each year. CELT is also the center coordinating service learning on campus and will be instrumental in re-designing the service learning program. We look forward to working with CELT in the future.

## **SECTION 16: SUMMARY OF STRENGTHS OF THE PROGRAM**

The strengths of the Biology program essentially remain unchanged from those stated in the most recent program review. In that review, the faculty were identified as the primary strength of the program because they are well-qualified, devoted to teaching, and maintain collegial working relations with each other. We have built on this strength and continue to hire excellent faculty. The new curriculum (at the time), which uses a more

developmental approach by adding in sophomore core courses and also incorporates a greater variety of pedagogies, was also cited as a strength. Our curriculum has been improved further through the innovative integration of laboratory and lecture experiences and maintenance of small class sizes. Throughout these curricular revisions, the Biology faculty have remained committed to offering a diversity of courses so that our students graduate with a broad exposure to the field. Our facilities and equipment have improved significantly since the last review and better support our programs and pedagogy.

## **SECTION 17: SUMMARY OF CHALLENGES FACING THE PROGRAM**

Despite the significant improvements in facilities and equipment since the last review, one of the primary challenges facing the program remains unchanged. Ten years ago, the executive summary program review stated that “concerns were raised by all three levels of review about the departments [sic] reliance on adjuncts and heavy work expectations for faculty, which impede the faculty’s ability to be engaged in more traditional forms of academic scholarship.” There are serious deficits in the level of institutional support for real scientific research and the provision of research experiences for undergraduates in biology.

The following issues need to be addressed:

- 1) Research with undergraduates is an uncompensated add-on to already burdensome teaching loads. Faculty need to be compensated for their efforts with release time and/or money. As an illustration of this point, the Dean of the School of Science and Social Science was recently awarded a strategic initiative which would pay incoming freshmen to engage in research with faculty. The students are provided with a significant stipend and some supply money was made available; however, despite repeated requests for compensation for the faculty, who have to train these novices and ensure their safety, none was provided. (The letter that was sent to the Dean regarding these issues is included in the appendices – Appendix 9.)
- 2) Research with undergraduates needs to be recognized and identified so that it better “fits” the traditional categories of teaching, service, and scholarship. Is it teaching? Is it service? Is it scholarship? Is it service learning? Is it an internship? Is it cooperative education? A case could be made for fitting research with undergraduates into any or all of these categories. Because it isn’t formally classified by the College, one of the most time-consuming and significant of faculty activities goes unrecognized and uncompensated.
- 3) We are grateful for our two excellent part-time technical staff; however, we have no technical support for teaching and research efforts in the summer. The part-time status of the two technicians means that they are only available to provide support for teaching, not research, efforts.
- 4) There is no technical support for equipment maintenance. In addition, Instructional Technology does not provide support for computers associated with laboratory equipment (even though they are used for teaching).
- 5) There is no supply money for research efforts. The Undergraduate Research Grant program can supply some money, but the limit of \$750 is insufficient for many types of projects and there is a significant lag time in getting funding for projects.

- 6) Some important infrastructural needs remain unmet. For example, there is no approved IACUC which precludes the ability of obtaining federal grants. There is no chemical hygiene officer on campus which means we are not compliant with OSHA regulations. The lack of a poster printer has made preparation for conferences onerous.
- 7) There is no compensation for grant-writing activities. The College wants science faculty to write grants but does not compensate for the time. The lack of supporting infrastructure for research with undergraduates makes *finding* the time to write grants almost impossible.

Another important challenge is the recent loss of a one-half position to the Environmental Studies Program. The loss of this position, along with other recent events, has greatly increased our reliance on adjunct faculty. While we have been able to hire well-qualified adjuncts, they do not contribute to the considerable service load of the Department, nor do they offer research experiences for undergraduates. The ultimate result is an ever-increasing burden on the remaining FTTT faculty,

Other challenges to the program include the continued level funding of our operating budget. Because we cannot afford many of the supplies we need, e.g. kits that increase efficiency, we spend more time than necessary preparing for lab activities. The need for frugality and the work that goes into finding cheaper, alternatives adds greatly to our workload. Our budget needs to increase annually to cover inflation, the increased shipping costs and expense of petroleum-based supplies, to expand the number of hands-on lab experiences we offer, to allow for more field-based experiences, and to integrate more lab experiences into our ISP offerings.

The lack of a departmental website and ability to communicate what we do remains a challenge for our department. The faculty have attempted to construct a website, but no one has the time or expertise to bring the project to completion. The College should develop a website for the Department to aid with student and faculty recruitment, to advertise our accomplishments, and to maintain valuable connections with our alumni. The College should develop a protocol for how we can communicate to the College and the outside world, the accomplishments of our students and faculty.

The Biology Department openly admits that it is unhappy with its current assessment plan and needs help with developing an alternative.

## **SECTION 18: PROGRAMMATIC ACTION PLAN**

The Biology Department plans to work diligently over the next couple of years to address the challenges listed above. We plan to:

- 1) Identify and implement a mechanism for compensating faculty for the research experiences they provide to undergraduates. One possibility includes the development of an independent study-like course, called "Research Experiences in Biology". Once a faculty member has offered 5 of these 4-credit research experiences, they would be eligible for a course release or monetary compensation for 4-credits of overload pay.
- 2) The Department will work with the new Coordinator for Experiential Learning, The Director of the Office of Sponsored Projects and Research (OSPR), the Dean, and the Provost to advocate for the support we need (technical, administrative, monetary) to facilitate year-round research activity.

- 3) We will also work with OSPR to identify ways to compensate faculty for their grant-writing efforts. Many grants provide significant indirect funds to the College and the faculty that bring funding to the campus could be compensated.
- 4) The Department will advocate for a new FTTT position in Biology to replace the half position lost to Environmental Studies to decrease our heavy reliance on adjuncts and relieve some of our workload burden.
- 5) The Department will lobby for an operating budget that better supports its teaching efforts and the need for new equipment.
- 6) The Department will work with the College to improve its visibility and to communicate its activities to the campus and beyond.



## **Appendices**

1. Provost/VPAA's Executive Report From Last Program Review (1999 – 2000)
2. Major and Minor Planning Sheets and Sample of An Individualized Major Program of Study, As Described in Text
3. (Included on CD) Excel Sheets With Raw Course Enrollments and Numbers of Majors and Minors Data from Institutional Research (IR)
4. Student Learning Outcomes
5. Most Recent (Completed) Assessment Plan and Report
6. Curriculum vitae for All Faculty (Full Time Tenure Track, followed by Adjunct, Contract Lecturer and PAT)
7. (Included on CD) Excel File With Raw Student Demographic Data from Institutional Research (IR)
8. Sample Course Syllabi
9. Letter to the Dean Regarding Concerns Over Freshman Research Program and Suggestions For Change

## **Appendix 1.**

### **Provost/VPAA's Executive Report From Last Program Review (1999 – 2000)**

## Results of Last Program Review

The dates of the last program reviews by the Vice President for Academic Affairs (Robert Golden) and the Senate Academic Overview Committee were from August 1999 to April 2000. These reviews are included in the appendices of this self-study. Two external reviewers from the University of Maine at Farmington and Colby College contributed to the reports.

The strengths of the Biology program were identified as the faculty, which were described as well-qualified, devoted to teaching, and collegial, and the curriculum, which was described as developmental in design and focused on student-learning. The primary weaknesses of the program were identified as the severe inadequacies of the facilities, equipment, and supply budgets; the heavy work expectations for the faculty; and the overall lack of support for traditional forms of scientific scholarship. It is important to note, that virtually all of the weaknesses identified in those reports could be defined as lack of institutional support for the program and its faculty and few, if any, of the issues can be remedied by the faculty alone.

Ten years later, Biology faculty remain collegial and committed to working collaboratively and creatively to improve our curriculum and to contribute significantly to the Integrative Studies Program and to the liberal arts mission of the College. While we are currently understaffed due to the death of a young, new faculty member and the loss of a half-time position to the new Environmental Studies Program, we anticipate that we will continue to identify and hire excellent faculty that are a good fit for our mission.

Since the last program review, many of the weaknesses listed above have been addressed. The Biology Department is now in the new Science Center and has well-designed classrooms and teaching laboratory spaces to support its new four-credit curriculum. The Department also has three shared research spaces to support faculty and undergraduate research efforts. We have purchased new equipment for teaching and research with College funds and with grants from the National Science Foundation. The recent hire of Penny Micelli to direct the Office of Sponsored Research has greatly facilitated grant-writing efforts at KSC. The Department was awarded a Strategic Initiative Grant in 2008 which allowed for the replacement and expansion of our entire microscope inventory. Our supply budget to support our courses has increased and, while still inadequate for some of our courses, has increased since the last review.

However, there are some very important challenges that remain unsolved. Faculty workload is even heavier than ever as faculty attempt to write grants, develop their research projects and spaces to their full potential, and contribute to the ever

expanding service work required by the College. The previous report stated that the outside reviewers were very concerned that “the strong synergy between research and teaching is not facilitated very well by KSC administrative support.” While we now have some of the facilities we need to support research with undergraduates, the lack of time, financial support, and ongoing technical support makes it difficult to sustain a viable research effort. Although providing research experiences for our majors is likely one of the most critical learning experiences we offer, we have yet to find a way to do this work and receive any form of compensation (time or money). While the College receives tuition for independent study credits, research with undergraduates remains an uncompensated, complete add-on to our current demanding teaching loads. This situation has led to an uneven workload distribution within the Department with some faculty offering undergraduate research experiences while others don’t. In addition, there is no incentive for faculty who are fully promoted to continue their research efforts.

## **Appendix 2.**

### **Major and Minor Planning Sheets and Sample of An Individualized Major Program of Study, As Described in Text**

# BIOLOGY: Bachelor of Science

(124 cr)

**Keene State College**

**2009-2010 Catalog**

*Meet with a faculty advisor in Biology to discuss your academic plans.  
This sheet is for general advising purposes only.*

## MAJOR REQUIREMENTS (76 credits)

### Core Courses (24 cr)

- |   |   |
|---|---|
| <input type="checkbox"/> BIO 110 Molecule and Cells   | <input type="checkbox"/> BIO 111 Evolution      |
| <i>(C or higher must be earned in both BIO 110 and 111 to take any 200-level or higher BIO course.)</i> |   |
| <input type="checkbox"/> BIO 210 Ecology  | <input type="checkbox"/> BIO 211 Genetics       |
| <input type="checkbox"/> BIO 212 Cells and Physiology   | <input type="checkbox"/> BIO 495 Senior Seminar |

### Upper-Level Courses (24 cr)

*Select **one** course from **each** of the four categories:*

#### Animal Diversity:

- |   |   |
|---|---|
| <input type="checkbox"/> BIO 333 Invertebrate Zoology | <input type="checkbox"/> BIO 334 Vertebrate Zoology |
| <input type="checkbox"/> BIO 335 Ornithology          |   |

#### Plant and Microbial Diversity:

- |  |  |
|--|--|
| <input type="checkbox"/> BIO 363 Plant Biology       | <input type="checkbox"/> BIO 365 Plant Evolution |
| <input type="checkbox"/> BIO 367 Microbial Diversity |  |

#### Ecology and Evolution:

- |  |  |
|--|--|
| <input type="checkbox"/> BIO 343 Ecosystem Ecology           | <input type="checkbox"/> BIO 345 Animal Behavior     |
| <input type="checkbox"/> BIO 347 Plant Physiological Ecology | <input type="checkbox"/> BIO 349 Population Genetics |

#### Cell/Molecular/Physiology:

- |  |  |
|--|--|
| <input type="checkbox"/> BIO 371 Ecophysiology | <input type="checkbox"/> BIO 373 Neuroethology                 |
| <input type="checkbox"/> BIO 375 Biochemistry  | <input type="checkbox"/> BIO 376 Molecular Biology             |
| <input type="checkbox"/> BIO 377 Immunology    | <input type="checkbox"/> BIO 379 Comparative Animal Physiology |

*Take two additional courses at the 300/400 level to bring total Biology credits to 48.*

*(Students may take BIO 232 Anatomy and Physiology II for four of these credits.)*

- |                                    |                                    |
|------------------------------------|------------------------------------|
| <input type="checkbox"/> BIO _____ | <input type="checkbox"/> BIO _____ |
|------------------------------------|------------------------------------|

### Related Science and Math Courses (28 cr)

- |  |  |
|--|--|
| <input type="checkbox"/> INCHEM 111 General Chemistry I    | <input type="checkbox"/> CHEM 112 General Chemistry II |
| <input type="checkbox"/> CHEM 221 Organic Chemistry I      | <input type="checkbox"/> CHEM 222 Organic Chemistry II |
| <input type="checkbox"/> INPHYS 141 College Physics I      | <input type="checkbox"/> PHYS 142 College Physics II   |
| <input type="checkbox"/> MATH 141 Introductory Statistics* |  |

*I-prefixed courses may also be used to fulfill Integrative Studies requirements; credits count once.*

*\*Math 141 will fulfill the Integrative Studies Program IQL requirement; credits count once.*

# Integrative Studies Program (ISP) Requirements: 44 cr

Keene State College

2009-2010 Catalog

*Integrative Studies classes will make up one-third of your undergraduate education. With both lower- and upper-level requirements, these classes are meant to be taken across your four years. Don't just fill in the blanks; look for classes that intrigue you.*

## Foundations

- ☐ ITW: Thinking & Writing (Take in either your first or second semester.)
- ☐ IQL: Quantitative Literacy (Take within your first three semesters.)

## Perspectives

*Only **one** course in any single discipline can be used to fulfill your Integrative Studies requirements within the **Perspectives** area. Disciplines are shown below in **BOLD** (such as **INBIO**) and may appear in more than one category (such as **IAENG** and **IHENG**). Write the course number and title of the classes you are taking in the spaces below. To review majors, courses and additional information, go to the on-line catalog: [www.keene.edu/catalog](http://www.keene.edu/catalog).*

**IA: Arts** – One course beginning with **IA**: **IAART**, **IAENG**, **IAMU** or **IATAD**.

☐ \_\_\_\_\_

**IH: Humanities** – Two courses in two different disciplines beginning with **IH**: **IHAMST**, **IHCOMM**, **IHENG**, **IHFILM**, **IHFR**, **IHGER**, **IHHGS**, **IHHIST**, **IHJRN**, **IHPHIL**, **IHSP**.

☐ \_\_\_\_\_ ☐ \_\_\_\_\_

**IA/IH: One additional course in either Arts or Humanities in a discipline not used above.**

☐ \_\_\_\_\_

**IN: Natural Sciences** – Two courses in two different disciplines beginning with **IN**: **INASTR**, **INBIO**, **INCHEM**, **INGEOL**, **INMET** or **INPHYS**.

☐ \_\_\_\_\_ ☐ \_\_\_\_\_

**IS: Social Sciences** – Two courses in two different disciplines beginning with **IS**: **ISANTH**, **ISECON**, **ISGEOG**, **ISPOSC**, **ISPYSC** or **ISSOC**.

☐ \_\_\_\_\_ ☐ \_\_\_\_\_

## Interdisciplinary

**II: One course in any discipline (even if already used in Perspectives) beginning with **II**:**

☐ \_\_\_\_\_

**NOTE:** In ISP, all students must complete a minimum of 28 credits at the 100-200 level and a minimum of 8 credits at the 300-400 level. A total of 24 100-200 level ISP credits (including both ITW and IQL) must be completed before taking a 300-400 level class.

Check your major requirements to see if any may also be used to fulfill an Integrative Studies requirement (look for the "I" prefix). Remember, however: credits count **once**.

# BIOLOGY: Bachelor of Arts

(120 cr)

Keene State College

2009-2010 Catalog

*Meet with a faculty advisor in Biology to discuss your academic plans.  
This sheet is for general advising purposes only.*

## MAJOR REQUIREMENTS (52 credits)

### Core Courses (24 cr)

- |   |   |
|---|---|
| <input type="checkbox"/> BIO 110 Molecule and Cells   | <input type="checkbox"/> BIO 111 Evolution      |
| <i>(C or better must be earned in both BIO 110 and 111 to take any 200-level or higher BIO course.)</i> |   |
| <input type="checkbox"/> BIO 210 Ecology  | <input type="checkbox"/> BIO 211 Genetics       |
| <input type="checkbox"/> BIO 212 Cells and Physiology   | <input type="checkbox"/> BIO 495 Senior Seminar |

### Upper-Level Courses (12 cr)

*Select a total of three courses from three of the categories below:*

#### Animal Diversity:

- |   |   |
|---|---|
| <input type="checkbox"/> BIO 333 Invertebrate Zoology | <input type="checkbox"/> BIO 334 Vertebrate Zoology |
| <input type="checkbox"/> BIO 335 Ornithology          |   |

#### Plant and Microbial Diversity:

- |  |  |
|--|--|
| <input type="checkbox"/> BIO 363 Plant Biology       | <input type="checkbox"/> BIO 365 Plant Evolution |
| <input type="checkbox"/> BIO 367 Microbial Diversity |  |

#### Ecology and Evolution:

- |  |  |
|--|--|
| <input type="checkbox"/> BIO 343 Ecosystem Ecology           | <input type="checkbox"/> BIO 345 Animal Behavior     |
| <input type="checkbox"/> BIO 347 Plant Physiological Ecology | <input type="checkbox"/> BIO 349 Population Genetics |

#### Cell/Molecular/Physiology:

- |  |  |
|--|--|
| <input type="checkbox"/> BIO 371 Ecophysiology | <input type="checkbox"/> BIO 373 Neuroethology                 |
| <input type="checkbox"/> BIO 375 Biochemistry  | <input type="checkbox"/> BIO 376 Molecular Biology             |
| <input type="checkbox"/> BIO 377 Immunology    | <input type="checkbox"/> BIO 379 Comparative Animal Physiology |

### Required Related Science and Math Courses (16 cr)

- ☐ INCHEM 111 General Chemistry I
- ☐ CHEM 112 General Chemistry II
- ☐ MATH 141 Introductory Statistics\*

*Select one of the following:*

- ☐ INPHYS 141 College Physics I -or- ☐ INGEOL 151 Introductory Physical Geology

*I-prefixed courses may also be used to fulfill Integrative Studies requirements; credits count once.*

*\*Math 141 will fulfill the Integrative Studies Program IQL requirement; credits count once.*



# Integrative Studies Program (ISP) Requirements: 44 cr

Keene State College

2009-2010 Catalog

*Integrative Studies classes will make up one-third of your undergraduate education. With both lower- and upper-level requirements, these classes are meant to be taken across your four years. Don't just fill in the blanks; look for classes that intrigue you.*

## Foundations

- ☐ ITW: Thinking & Writing *(Take in either your first or second semester.)*
- ☐ IQL: Quantitative Literacy *(Take within your first three semesters.)*

## Perspectives

*Only **one** course in any single discipline can be used to fulfill your Integrative Studies requirements within the **Perspectives** area. Disciplines are shown below in **BOLD** (such as **INBIO**) and may appear in more than one category (such as **IAENG** and **IHENG**). Write the course number and title of the classes you are taking in the spaces below. To review majors, courses and additional information, go to the on-line catalog: [www.keene.edu/catalog](http://www.keene.edu/catalog).*

**IA: Arts** – *One course beginning with IA: IAART, IAENG, IAMU or IATAD.*

☐ \_\_\_\_\_

**IH: Humanities** – *Two courses in two different disciplines beginning with IH: IHAMST, IHCOMM, IHENG, IHFILM, IHFR, IHGER, IHHGS, IHHIST, IHJRN, IHPHIL, IHSP.*

☐ \_\_\_\_\_ ☐ \_\_\_\_\_

**IA/IH:** *One additional course in either Arts or Humanities in a discipline not used above.*

☐ \_\_\_\_\_

**IN: Natural Sciences** – *Two courses in two different disciplines beginning with IN: INASTR, INBIO, INCHEM, INGEOL, INMET or INPHYS.*

☐ \_\_\_\_\_ ☐ \_\_\_\_\_

**IS: Social Sciences** – *Two courses in two different disciplines beginning with IS: ISANTH, ISECON, ISGEOG, ISPOSC, ISPYSC or ISSOC.*

☐ \_\_\_\_\_ ☐ \_\_\_\_\_

## Interdisciplinary

**II:** *One course in any discipline (even if already used in Perspectives) beginning with II:*

☐ \_\_\_\_\_

**NOTE:** *In ISP, all students must complete a minimum of 28 credits at the 100-200 level and a minimum of 8 credits at the 300-400 level. A total of 24 100-200 level ISP credits (including both ITW and IQL) must be completed before taking a 300-400 level class.*

*Check your major requirements to see if any may also be used to fulfill an Integrative Studies requirement (look for the "I" prefix). Remember, however: credits count **once**.*

# BIOLOGY Minor

(24 cr)

Keene State College

2009-2010 Catalog

*Meet with a faculty advisor in Biology to discuss your academic plans.  
This sheet is for general advising purposes only.*

## MINOR REQUIREMENTS: 24 credits

### Core Courses (20 credits):

- ☐ BIO 110 Molecules and Cells\*
- ☐ BIO 111 Evolution\*
- ☐ BIO 210 Ecology
- ☐ BIO 211 Genetics
- ☐ BIO 212 Cells and Physiology

*\*Students must earn grades of C or higher in both BIO 110 and BIO 111 in order to take any 200-level or higher BIO course.*

Upper-level elective course: Select any 300- or 400-level BIO course (4 credits) to bring the total credits in Biology to 24 credits

☐ \_\_\_\_\_

**Title:**  
**Behavioral Biology, Bachelor of Science**

**Name:** [REDACTED] **ID#:** [REDACTED]

**Local/Permanent Address:** [REDACTED]

**Phone (Home):** [REDACTED] **Phone (Cell):** [REDACTED]

**E-Mail Address:** [REDACTED]

**Date of Proposal:** 2/13/07

**Date of Completion:** May 2008

**Rationale:**

I have designed this Individualized Major to meet my academic desire to matriculate into a MSTP (MD/PhD dual degree) program after graduating Keene State College. As an undergraduate, I have the unique opportunity to be exposed to a wide variety of disciplines and studies. Once in a graduate program, my focus will be obviously narrowed. While the normal route to Medical School involves a Biology and/or Chemistry major, I believe my time spent here should not be limited to what I will work on for the rest of my life. To that end, I wish to combine the Social Science of Psychology with the basic sciences of Biology and Chemistry in order to meet my personal interests and academic goals.

I believe that integrating a discipline that studies people and their behavior holistically complements the study of life and its chemical elements on a microscopic level. These components of my major give me a broader view of the world in which I live in, the people I interact with, and will better prepare me for a future in the human health field. The following courses appeal to me intellectually as well as meet the requirements for admittance to most Medical Colleges.

**Psychology Component Course Requirements:**

**Completed or In Progress Courses:**

- PSYC-101 General Psychology 3A
- PSYC-251 Psychological Statistics 3A
- PSYC-252/254 Research Methods in Psychology and Lab 3A/1A

**Planned Courses:**

- PSYC-253 Brain and Behavior 3A
- • PSYC-382 History of Psychology or 495 (next page) 3A
- PSYC-498 Independent Study 3A

(253 will be taken during Summer Session One, and credit weight will be given to the Independent Study at the time it is designed)

**Alternative Course:**

(In case of History of Psychology unavailability)

- PSYC-495 Seminar 345 3A

**16+ Credits Total****3+ Credits at the 300+ level**

Final credit number dependent on Independent Study

**Biology Component Course Requirements:****Completed or In Progress Courses:**

- BIO-153/154 Life: Processes and Lab 3A/1AB
- BIO-151/152 Life: Diversity and Lab 3A/1AB
- BIO-230/231 Human Anatomy and Physiology I and Lab 3A/1AB
- BIO-498 Independent Study 4A (spot)

**Planned Courses:**

- BIO-373 Neurobiology 4A
- BIO-375 Biochemistry 4A
- BIO-376 Molecular Biology 4A
- BIO-498 Independent Study 4A

**Biology Alternate Course:**

(In case of Neurobiology unavailability)

- BIO-367 Microbial Diversity

**24 Credits Total** not counting Independent Study (37-39 Including)

**12 Credits at the 300+ level**, not counting Independent Study (25-28 Including)

Final credit number dependent on Independent Study weight

**Chemistry Component Course Requirements:****Completed or In Progress Courses:**

- CHEM-111/115 General Chemistry I and Lab 3A/1A
- CHEM-112/116 General Chemistry II and Lab 3A/1A
- CHEM-221/225 Organic Chemistry I and Lab 3A/1A
- CHEM-222/226 Organic Chemistry II and Lab 3A/1A

**16 Credits Total**

**56+ Total Credits in the Major (69-78 Credits with Independent Study)**

### **Appendix 3.**

#### **Raw Data Regarding Biology Course Enrollment, As Provided by KSC Institutional Research**

**(note, analysis of this data is presented in text, figures and tables within the  
self-assessment report)**

**THIS DATA IS INCLUDED ELECTRONICALLY ON A CD AS IT IS A  
MULTI-PAGE, CRUDELY FORMATTED FILE. THE CD IS LOCATED IN  
THE BINDER POCKET.**

**THE DATA IS PROVIDED HERE EXACTLY AS RECEIVED BY KSC IR.**

## **Appendix 4.**

### **Student Learning Outcomes**

## Mission of the Biology Department

Our goal is to foster an understanding of biology not as a compilation of unchanging facts but as a way of thinking, always subject to revision based on new insights and observations. Our programs teach students the scientific method, a mode of inquiry involving rational observation, experimentation and critical analysis. Through our programs students will develop an understanding of all forms of life, their evolutionary histories and relationships, and their interactions at levels of integration ranging from molecular to biospheric. We prepare students for graduate programs in biology and for a broad range of biology-related careers including those in the fields of biotechnology, environment, medicine and teaching. Our department supports the Keene State College liberal arts mission through the cultivation of an appreciation of natural science and its relevance in society for all Keene State College students including non-Biology majors.

## Student Learning Outcomes

- I. Biology majors will be able to demonstrate understanding in the following fundamental areas of the biological sciences:
  - 1. Biological Diversity.** *Biological diversity* is the diversity of subspecies, species, and higher level taxa or clades, the phylogenetic relationships of those taxa, and the features that distinguish specific lineages or taxa. This concept does not include genetic or phenotypic diversity of individuals within a species.
  - 2. Evolution.** *Evolution* consists of change in the hereditary characteristics of groups of organisms over the course of generations. It encompasses several subdisciplines: behavioral evolution, evolutionary developmental biology, evolutionary ecology, evolutionary genetics, evolutionary systematics, paleontology, and molecular evolution.
  - 3. Sub-organismal biology.** *Sub-organismal* refers to the structure, function, and evolution of the components of individual organisms, from the molecular level to tissue and /or organ-system level. This includes, but is not limited to, biochemistry and metabolism, proteomics, genetics, molecular and cell biology, neurobiology, and physiology.
  - 4. Organismal biology.** The term *organismal* refers to individual organisms and their structures and processes, such as reproduction, development, life cycle events, ecophysiology, behavior, feeding, locomotion, dispersal, and mortality. Whether applied to single-celled microorganisms or to complex multicellular organisms, 'organismal' denotes specific modes of survival and reproduction and refers to the target or object of natural selection.
  - 5. Supra-organismal biology.** *Supra-organismal* refers to populations, communities, ecosystems and other higher levels of biological organization such as landscape, biome or biosphere. It includes focus on patterns of diversity, community succession, species interactions, behavioral ecology, population dynamics, trophic structure, nutrient cycling, and energy flow.

- II. Biology majors will be able to develop testable hypotheses, design experiments to test hypotheses, and conduct experiments including data collection, analysis, interpretation and presentation. They will also be able to effectively search computer databases for relevant literature (primary and secondary) on scientific topics.
- III. Biology majors will demonstrate critical thinking and communication skills, both oral and written, for the purposes of conveying biological information to professional scientists and the lay public.
- IV. Biology majors will develop intellectual independence, scientific literacy, and an appreciation for the connections between biological science and society.



## **Appendix 5.**

### **Most Recent (Completed) Assessment Plan and Report**

## Department of Biology Assessment Plan 2007-2008

### Mission of the Biology Department

Our goal is to foster an understanding of biology not as a compilation of unchanging facts but as a way of thinking, always subject to revision based on new insights and observations. Our programs teach students the scientific method, a mode of inquiry involving rational observation, experimentation and critical analysis. Through our programs students will develop an understanding of all forms of life, their evolutionary histories and relationships, and their interactions at levels of integration ranging from molecular to biospheric. We prepare students for graduate programs in biology and for a broad range of biology-related careers including those in the fields of biotechnology, environment, medicine and teaching. Our department supports the Keene State College liberal arts mission through the cultivation of an appreciation of natural science and its relevance in society for all Keene State College students including non-Biology majors.

### Student Learning Outcomes

- I. Biology majors will be able to demonstrate understanding in the following fundamental areas of the biological sciences:

- 1. Biological Diversity.** *Biological diversity* is the diversity of subspecies, species, and higher level taxa or clades, the phylogenetic relationships of those taxa, and the features that distinguish specific lineages or taxa. This concept does not include genetic or phenotypic diversity of individuals within a species.

- 2. Evolution.** *Evolution* consists of change in the hereditary characteristics of groups of organisms over the course of generations. It encompasses several subdisciplines: behavioral evolution, evolutionary developmental biology, evolutionary ecology, evolutionary genetics, evolutionary systematics, paleontology, and molecular evolution.

- 3. Sub-organismal biology.** *Sub-organismal* refers to the structure, function, and evolution of the components of individual organisms, from the molecular level to tissue and /or organ-system level. This includes, but is not limited to, biochemistry and metabolism, proteomics, genetics, molecular and cell biology, neurobiology, and physiology.

- 4. Organismal biology.** The term *organismal* refers to individual organisms and their structures and processes, such as reproduction, development, life cycle events, ecophysiology, behavior, feeding, locomotion, dispersal, and mortality. Whether applied to single-celled microorganisms or to complex multicellular organisms, 'organismal' denotes specific modes of survival and reproduction and refers to the target or object of natural selection.

- 5. Supra-organismal biology.** *Supra-organismal* refers to populations, communities, ecosystems and other higher levels of biological organization such as landscape, biome or

biosphere. It includes focus on patterns of diversity, community succession, species interactions, behavioral ecology, population dynamics, trophic structure, nutrient cycling, and energy flow.

- II. Biology majors will be able to develop testable hypotheses, design experiments to test hypotheses, and conduct experiments including data collection, analysis, interpretation and presentation. They will also be able to effectively search computer databases for relevant literature (primary and secondary) on scientific topics.
- III. Biology majors will demonstrate critical thinking and communication skills, both oral and written, for the purposes of conveying biological information to professional scientists and the lay public.
- IV. Biology majors will develop intellectual independence, scientific literacy, and an appreciation for the connections between biological science and society.

### **Program Assessment history: Closing the loop**

From 2003 - 2005, the Biology department used an assessment exam to assess outcomes I#2, I#3, and II (see student learning outcomes below). The data generated from this exam (Table 1) indicate that while students were relatively strong in the last two years of the study for outcomes I#3 and II, we needed to place greater emphasis on outcome I#2: evolution. Since an understanding of evolution is fundamental to all areas within biology, and since there is mounting public misunderstanding and adversity to understanding evolutionary processes, we especially focused on this area in the revision of our curriculum. We redesigned one of our two core introductory courses for majors to focus on evolution and retitled it, BIO 111 Evolution.

**Table 1.** Average exam scores and percentages for assessment of learning outcomes I (2), I(3) and II. All subscores are out of a possible total of 33. The total is based the percentage out of 99 points possible.

<b>Semester</b>	<b>I. #2. Evolution</b>	<b>I. #3. Sub-organismal</b>	<b>II. Scientific Investigation</b>	<b>Total</b>
SP 2003	21 (64%)	15 (44%)	24 (73%)	60%
SP 2004	16 (49%)	23 (69%)	21 (65%)	60%
SP 2005	16 (49%)	26 (77.%)	18 (55%)	60%

## **Biology, B.S. Program Assessment Plan 2008**

We are expanding the assessment of our Biology program to include all of our student learning outcomes using three main assessment tools:

1. **Assessment exam**
2. **Scientific lab report**
3. **Participation in Senior Seminar**

### *Learning Outcome I*

Student learning outcomes (I) will be addressed using an assessment exam. This exam (Appendix I.), written by the KSC biology faculty, addresses all learning outcomes described above under outcome I. It will be given at the end of the sophomore and senior years. Scores can be compared across years, as well as between 2<sup>nd</sup> and 4<sup>th</sup> year students.

### *Learning Outcome II*

Student learning outcome II will be addressed using questions on the assessment exam as well as through the assessment of a laboratory report. We are still in the process of deciding which scientific laboratory report we will use for assessment. Appendix II, is a draft of some rubrics to be used.

### *Learning outcome III*

Student learning outcome III will be addressed through the assessment of the laboratory report, as well as through presentations and participation in senior seminar (see below).

### *Learning Outcomes IV*

All biology seniors are required to take BIO 495, the capstone seminar course. In this class, students are required to lead integrative discussions through analysis of primary literature on recent research in biology. They are also required to discuss the social, environmental, historical, global and political relevance of the research that they are analyzing. Student oral presentations and discussion participation will be assessed. This part of our assessment program is still under construction.

Appendix I. Assessment Exam (in separate document)

Appendix II. Rubrics for evaluating scientific paper (in draft form below)

Appendix III. Rubrics for evaluating capstone performance (under construction)

## Appendix II.

### Scientific Paper Assessment Rubrics. All items will be scored 0-3. (draft)

---

#### Title and Abstract

- \_\_\_\_ 1. Does the title appropriately reflect the study?  
 \_\_\_\_ 2. Does the abstract properly summarize the whole paper?  
 \_\_\_\_ 3. Is the abstract too long? Includes more than necessary for an abstract?

#### Introduction

- \_\_\_\_ 4. Is the background of the study set up properly? (too general or brief?)  
 \_\_\_\_ 5. Were appropriate references cited? \_\_\_\_ 6. Were the purposes/hypotheses of the study stated clearly?

#### Methods

- \_\_\_\_ 7. Study site/species descriptions present?  
 \_\_\_\_ 8. Sufficient detail of methodology? \_\_\_\_ 9. Too long, unnecessary detail? \_\_\_\_ Past tense used?  
 \_\_\_\_ 10. Description of equipment? \_\_\_\_ 11. \_\_\_\_ experimental set-up described? \_\_\_\_ 12. \_\_\_\_ Sample sizes given?  
 \_\_\_\_ 13. Is there description of data analysis/statistical tests used?

#### Results

- \_\_\_\_ 14. Were patterns, trends, and observations stated clearly, completely and specifically?  
 \_\_\_\_ 15. Are there figures or tables for which no description or reference is made in the text?  
 \_\_\_\_ 16. Are there statements in text for which there are no data?  
 \_\_\_\_ 17. Appropriate references made to table or figure corresponding to stated result?

#### Figures and Tables:

- \_\_\_\_ 18. Numbered in order referred to in text?  
 \_\_\_\_ 19. Is a figure labeled as such and not as a table? or vice versa?  
 \_\_\_\_ 20. Is data presented only once and not repeated in tables and figures?  
 \_\_\_\_ 21. Is only analyzed data and not raw data presented?  
 \_\_\_\_ 22. Are figures drawn properly and clearly? \_\_\_\_ 23. Do figures have appropriate captions?  
 \_\_\_\_ 24. Are axes labeled properly? \_\_\_\_ 25. Are units missing?  
 \_\_\_\_ 26. Are means presented with standard deviation or standard error?  
 \_\_\_\_ 27. Do tables have appropriate headings? \_\_\_\_ 28. Are they clear and easy to read?

#### Results of Statistical Tests:

- \_\_\_\_ 29. Were significant differences (or not) stated as such?  
 \_\_\_\_ 30. Were specifics given for direction of trend? (i.e., which sample was higher or lower?)  
 \_\_\_\_ 31. Was the statistical value presented with probability values after trends were stated?

#### Discussion

- \_\_\_\_ 32. Are the results of this study discussed? \_\_\_\_ 33. Is any data presented in the results not discussed?  
 \_\_\_\_ 34. Are sufficient explanations given for the trends or patterns found (or not found)?  
 \_\_\_\_ 35. Are speculations backed up with some reference to cited literature?  
 \_\_\_\_ 36. Are the appropriate references used? \_\_\_\_ 37. Is the discussion focused?  
 \_\_\_\_ 38. Are general conclusions drawn?  
 \_\_\_\_ 39. Are there any suggestions for future studies based on these results?

#### Literature Cited

- \_\_\_\_ 40. Is reference list in a consistent and correct format? \_\_\_\_ 41. Are citations complete?  
 \_\_\_\_ 42. Are there citations in this list that are not referred to in the text?  
 \_\_\_\_ 43. Are there citations in the text that do not appear in this list?

**General, Writing Style**

- \_\_\_\_ 44. Handed in on time? \_\_\_\_ 45. Does grammar need work? \_\_\_\_ 46. Are there too many spelling errors?  
\_\_\_\_ 47. Are there too many typos or computer printing errors? (I.e., was the final copy proof-read?)  
\_\_\_\_ 48. Too many awkward sentences or non-sentences? \_\_\_\_ 49. Too many run-on sentences?  
\_\_\_\_ 50. Double spaced? \_\_\_\_ 51. Stapled?

## Annual Assessment Report to the Deans

Department/Program: Department of Biology

### PROGRAM OUTCOMES AND MEANS OF ASSESSMENT

For our new four year plan, we have expanded the assessment of our Biology program to include all student learning outcomes using two main assessment tools:

1. A comprehensive assessment exam developed by the Biology faculty, administered in the capstone Senior Seminar course (implemented Year One)
2. Representative written scientific reports from multiple upper-level Biology courses (to be implemented Year Two)

### STUDENT LEARNING OUTCOMES ASSESSED IN THE LAST ACADEMIC YEAR

The following six student learning outcomes were addressed using an in-class assessment exam. This exam (Appendix I), written by the KSC Biology faculty, addressed all learning outcomes described below and was administered during our capstone seminar course, BIO 495.

For content categories #1-5 below, students will demonstrate an understanding of:

- 1. Biological Diversity.** *Biological diversity* is the diversity of subspecies, species, and higher level taxa or clades, the phylogenetic relationships of those taxa, and the features that distinguish specific lineages or taxa. This concept does not include genetic or phenotypic diversity of individuals within a species.
- 2. Evolution.** *Evolution* consists of change in the hereditary characteristics of groups of organisms over the course of generations. It encompasses several subdisciplines: behavioral evolution, evolutionary developmental biology, evolutionary ecology, evolutionary genetics, evolutionary systematics, paleontology, and molecular evolution.
- 3. Sub-organismal biology.** *Sub-organismal* refers to the structure, function, and evolution of the components of individual organisms, from the molecular level to tissue and /or organ-system level. This includes, but is not limited to, biochemistry and metabolism, proteomics, genetics, molecular and cell biology, neurobiology, and physiology.
- 4. Organismal biology.** The term *organismal* refers to individual organisms and their structures and processes, such as reproduction, development, life cycle events, ecophysiology, behavior, feeding, locomotion, dispersal, and mortality. Whether applied to single-celled microorganisms or to complex multicellular organisms, 'organismal' denotes specific modes of survival and reproduction and refers to the target or object of natural selection.
- 5. Supra-organismal biology.** *Supra-organismal* refers to populations, communities, ecosystems and other higher levels of biological organization such as landscape, biome or biosphere. It includes focus on patterns of diversity, community succession, species interactions, behavioral ecology, population dynamics, trophic structure, nutrient cycling, and energy flow.

**6. Scientific investigation.** Students will be able to develop testable hypotheses, design experiments to test hypotheses, and conduct experiments including data collection, analysis, interpretation and presentation. They will also be able to effectively search computer databases for relevant literature (primary and secondary) on scientific topics.

#### **RESULTS OF ASSESSMENT**

Unfortunately, our departmental assessment exam did not generate usable data for Academic Year 2007-2008 (see below). We did, however, gain invaluable information that has helped us to improve the assessment process during AY 2008-2009 and future years.

Our assessment exam was given in Spring 2008 in the old (2 credit) version of our capstone senior seminar course, BIO 495. Although this is a logical time to deliver such a test to our seniors, its ultimate implementation was problematic. The test was administered during the final exam period and no point credit was associated with completion of the test (i.e. participation was voluntary) which significantly reduced the number of students who showed up to take the test and diminished the performance of those who did show up. Any analysis of these test results would, therefore, be biased and misleading.

Such a situation will be avoided this year through the following changes. Point value will be assigned to test completion and performance and administration of the (4-5 hour) test will be spread out over several weeks. In addition, BIO 495 is now a 4-credit Fall semester course which helps to combat senior fatigue.

It also became clear that we were not assessing a true representation of our graduating senior class. Our capstone course, BIO 495, was designed to help students lead integrative discussions through analysis of primary literature on recent research in biology. They are encouraged to discuss the social, environmental, historical, global and political relevance of each research topic. However, only our B.S. candidates are required to take BIO 495 while our B.A. graduates do not have to enroll (and usually do not). Therefore, any data collected during this past assessment cycle was not wholly representative of our senior class. Starting AY 2009-2010, we will make BIO 495 a mandatory capstone course for all biology majors, regardless of degree type.

During Year Two of our plan, we will assess the ability of our upper-level students to communicate scientific information in the form of scientific reports. Written reports from multiple upper-level Biology courses will be collected and a representative sample assessed using a rubric (Appendix II).

In summary, while the Biology Department spent countless hours during AY 08/09 developing an assessment exam for its seniors, significant problems occurred during the administration of the exam and no data of value were generated. The problems that occurred during Year One have now been addressed such that during Year Two, our exam will be administered in a manner that generates useful data. We will implement phase two of our assessment plan next year by collecting written scientific reports from multiple upper-level courses to assess student ability to communicate scientific information. Additionally, students in our B.A. program will be required to take BIO 495 Senior Seminar to ensure that we assess the learning of all of our majors.



Appendix I. Assessment Exam

Appendix II. Rubric for evaluating scientific papers

## **Appendix 6.**

**Curriculum vitae for All Faculty (Full Time Tenure Track, followed by  
Adjunct, Contract Lecturer and PAT)**

## **Full-Time Tenure Track Faculty**

**Kenneth D. Bergman, Ph.D.**

- Address:** Department of Biology  
Keene State College  
229 Main St.  
Keene, NH 03435-2001  
phone: (603)-358-2580, home: (603)-352-3429  
fax: (603)-358-2257, email: kbergman @keene.edu
- Degrees Held:** Ph.D., Cell & Developmental Biology, Harvard University: 1977  
A.B., Zoology, University of California, Berkeley: 1971
- Positions Held:** Professor of Biology, Keene State College (1993 – present)  
Associate Professor of Biology, Keene State College (1986-1993)  
Assistant Professor of Biology, Keene State College (1979-86)  
Consultant, Schleicher & Schuell (summers 1987, 1988)  
Coordinator of Biology Department (1993 – 1996)  
Coordinator of Biology Department (1983-1986)  
Postdoctoral Fellow in Biology, Harvard University (1976-78)  
Postdoctoral Research Fellow, Harvard (1976-1978)
- Grants:** Keene State College Faculty Development Grant: Galapagos Islands (2006)  
Keene State College Faculty Development Grant: New England Summer Epidemiology Institute (1991)
- Awards:** KSC Alumni Association Excellence in Teaching Award 2000
- Appointments:** Crotched Mountain Rehabilitation Center Institutional Review Board (2007 – present)
- Professional Memberships:** American Association for the Advancement of Science  
American Ornithologists Union  
National Center for Science Education
- Publications:**  
K Bergman, UW Goodenough, DA Goodenough, J Jawitz and H Martin. 1975. Gametic differentiation in *Chlamydomonas reinhardtii*. II. Flagellar membranes and the agglutination reaction. The Journal of Cell Biology, Vol 67, 606-622
- Photographic Exhibitions:**  
Photos of New Zealand landscape and wildlife displayed at the Thorne-Sagendorph Gallery (Keene State College) as part of an exhibit of indigenous art from Australia and New Zealand (*Earth & Spirit*: Fall, 2008)

Image of a rare Cuban palm included in ARKive, the international online database of endangered/threatened species: <http://www.arkive.org/carossier-palm/attalea-crassipatha/image-G52942.html>

**Graduate Thesis Committees (Antioch-New England master's degree students):**

Lance Tanino: Songbird use of forested landscapes (2008)

Angela Michaels: research supervision (2008-2009)

Christine Volonte: 2009

**Sponsored undergraduate presentations:**

Hideriotis, K. K. Bergman and S. Whittemore. Effects of endocrine-disrupting chemicals on the vocalizations of *Xenopus laevis* adults. Northeast Undergraduate Research and Development Symposium (ME) March 2009.

Dulaney, Caroline. Variation in geotaxis behavior among wild populations of *Drosophila*. Keene State College Academic Excellence Conference, (April 2005)

Maher, Andrea. Relationships between tree height, trunk diameter and trunk area in *Pinus strobus*, *Acer saccharum* and *Malus sylvestris*. Keene State College Academic Excellence Conference, (April 2002)

Stines, Michelle. Nesting Habits of Diamondback Terrapins on Cape Cod. Keene State College Academic Excellence Conference, (April 2002)

**Examples of other sponsored undergraduate research (independent study projects):**

Greg Drugan: Developmental synchrony in *Drosophila melanogaster*

Eric Swope: Size/age relationships in black bass in natural and artificial water bodies

Lesley Loberant: Relationship of stature to handedness in professional baseball players

Michelle Hood: Interspecific algal competition (competitive exclusion) *in vitro*

**Relevant Courses Taught at KSC**

Life: Diversity (Bio 151)

Evolution (Bio 110)

Genetics (Bio 211)

Vertebrate Zoology (Bio 334)

Ornithology (Bio 335)

Biology Senior Seminar (Bio 495)

Evolution and Conservation of Biodiversity (Bio 105)

Evolution and Genetics of Sex (Integrative Studies Program) (INBIO 300)

**Recent Service Work at KSC: 2004 to present**

Microbiology Faculty Search Committee (Biology)

Microscope Committee member (Biology)

Biology Assessment Committee member

Biology Discipline Peer Evaluation Committees (DPECs):

Renate Gebauer (chair)

Loren Launen (member)  
Kristen Porter-Utley (member)  
Colin Abernathy (member)  
NEASC Keene State College Self-Study Steering Committee: member  
NEASC Keene State College Self-Study Standard 5 (faculty standard) Committee: chair  
Thorne Art Gallery Advisory Committee  
Keene State College Institutional Animal Care and Use Committee  
Crotched Mountain Rehabilitation Center Institutional Review Board



**Patrick M. Eggleston**

Biology Department

Keene State College, Keene, New Hampshire 03435

Appointment to **Keene State College** September 1975. Tenure: September 1981. Full professor: September 1987.

**Educational Preparation**

Institution	Degree	Field of Study	Date of Award
Ohio State University	PhD	Zoology and Ecology	1975
Cornell University	MS	Pomology and Plant Physiology	1966
Michigan State University	BS	Horticulture	1963

**Professional membership**

Phycological Society of America -- life member

Journal of Phycology

**Presentations:**

Eggleston, P. M., Schlette, D. P. and Skalny, M. S. 1991. The effect of nitric and sulfuric acids on the growth rate of *Nitzschia palea* (Kutz.). Presented at the Fourth International Phycological Congress at Duke University, Durham, North Carolina. Paper presented by Patrick M. Eggleston. August 1991.

Schlette, D. P., Skalny, M. S., and Eggleston, P. M. 1990 The effect of nitric and sulfuric acids on the growth rate of *Nitzschia palea* (Kutz.). Presented at the Beta Beta Beta Northeastern Convention, at Hartwick College, Oneonta, New York on 21 April 1990. Research directed by Patrick M. Eggleston. Paper presented by Deb Schlette.

Eggleston, P. M. 1986. The acid tolerance of *Nitzschia palea*. Paper presented June 1986 to the combined meetings of the American Society of Limnology and Oceanography and the Phycological Society of America at the University of Rhode Island.

Eggleston, P. M. 1986. The acid tolerance of *Nitzschia palea*. Poster presentation at the Northeast Algal Symposium, Woods Hole, Mass.

Eggleston, P. M. 1981. The assimilation of nutrients from the algae by the crayfish, *Orconectes rusticus*. Paper presented at Northeast Algal Symposium, Wood Hole, Mass.

Lee, T. F. and Eggleston, P. M. 1980. Airborne algae of the New England coast collected on marine media. Paper presented at Botany 80 in Vancouver, British Columbia to the Phycological Society of America.



**Patrick M. Eggleston**

**Publications:**

Eggleston, P. M., Loiselle, D. S. and Skalny, M. S. 1991. The effects of nitric and sulfuric acids on the diatom *Nitzschia palea* (Kutz.) W. Smith. **Journal of Freshwater Ecology** 6(4): 451-453.

Lee, T. F. and Eggleston, P. M. 1989. Airborne algae and Cyanobacteria. **Grana** 28: 63-66.

Eggleston, P. M. Wilson, R. T., and Harrington, C. B. 1987. The effect of two buffers on cell yield of *Nitzschia palea* (Kutz.) W. Smith. **Journal of Freshwater Ecology** 4(1): 33-38.

Eggleston, P. M. and Lustick, S. I. 1981. The oxygen requirements of the crayfish, *Orconectes rusticus*. **Ohio Journal of Science** 81(2): 92-94.

**Photos published:**

Cover of Nanotechnology: photo of *Eunotia*

The Botanical World. Wm. C. Brown Inc. Photo of diatoms Used in two editions.

**Teaching:**

Spring 2009: INBIO 104 Freshwater Ecology – 2 sections

Bio 490 Aquatic Ecology – 1 section

Fall 2008: Bio 210 Ecology – 2 sections

INBIO 104 Freshwater Ecology – 1 section

Spring 2008: INBIO 104 Freshwater Ecology – 3 sections

Fall 2007: Bio 104 Freshwater Ecology – 3 sections

Spring 2007: Bio 104 Freshwater Ecology – 3 sections

Fall 2006: Biology 101 Evolution and Conservation of Biodiversity – 2 sections

ENST 100 Intro to Environmental Studies – 2 sections

Spring 2006: Biology 101 Evolution and Conservation of Biodiversity – 2 sections

ENST 100 Intro to Environmental Studies – 2 sections

Spring 2005: Bio 104 Freshwater Ecology

ENST 100 Intro to Environmental Studies

Biology 101 Evolution and Conservation of Biodiversity

Fall 2004: Biology 101 Evolution and Conservation of Biodiversity

Spring 2004: Biology 101 Evolution and Conservation of Biodiversity

ENST 100 Intro to Environmental Studies

## Curriculum Vitae

***Karen Rose Cangialosi***

### Addresses and Phone Numbers

Dept. of Biology, MS 2001  
Keene State College  
Keene, NH 03435-2001  
603-358-2578

1263 County Rd  
Walpole, NH 03608  
603-756-3834 home  
603-852-3623 cell

### Education

- Ph.D., 1990,      *Zoology*, Miami University. Dissertation title: The behavioral and ecological interactions of the kleptoparasitic spider, *Argyrodes ululans*, and its social spider host, *Anelosimus eximius*.
- M.S., 1985,      *Biological Sciences*, University of Cincinnati. Thesis title: The influence of environment, heredity, and juvenile experience on the social structure of *Metepeira spinipes*.
- B.A., 1982,      *Biological Sciences*, University of Maryland Baltimore County.

### Administrative Positions

- Spg 2006-current      *Chair*, Dept. of Biology, Keene State College
- Fall 1998-Spg 2004      *Chair*, Dept. of Biology, Keene State College
- Fall 1996-Spg 1998      *Coordinator*, Women's Studies Program, Keene State College  
Fall 2002-Spg 2003

### Faculty/Teaching Positions

- Fall 2001-present      *Professor*, Dept. of Biology, Keene State College
- Fall 1997-Spg 2001      *Associate Professor*, Dept. of Biology, Keene State College
- Fall 1992-Spg 1997      *Assistant Professor*, Dept. of Biology, Keene State College.
- Fall 1990-Spg 1992      *Visiting Assistant Professor*, Dept. of Zoology, Miami University.
- Spring 1990      *Visiting Instructor*, Dept. of Zoology, Miami University.
- 1988 (10 months)      *Resident Naturalist*, Explorer's Inn, Tambopata Reserved Zone (Amazon), Madre de Dios, Perú. Duties included giving guided tours of the flora and fauna of the tropical rainforest.
- 1986-1987      *Teaching Fellow Lecturer*, Miami University.
- 1985-1989      *Laboratory Teaching Assistant*, Miami University.
- 1983-1985      *Laboratory Teaching Assistant*, University of Cincinnati.

## Teaching Experience

### **Courses taught (at KSC)**

- Population Ecology, Community and Ecosystem Ecology, Animal Behavior, Ecology and Evolution, Experimental Ecology, Research Methods, Tropical Marine Biology, Life: Processes, Life: Diversity, Invertebrate Zoology, Forensic science, Introduction to Environmental Studies, Senior Seminar in Environmental Studies, Women's Studies Seminar, Women's roles in Mexico, Quantitative Literacy

### **Field Courses**

- **Tropical Marine Biology.** For the last nine years, I have organized and brought groups of students to the island of Providenciales in the Turks and Caicos Islands (British West Indies) to study marine biology through scuba diving, snorkeling, lectures, kayaking, and other excursions.
- **Women's Roles in Mexico.** I organized a field course entitled Women's roles in Mexico. We brought a group of students to Mexico city and surroundings to learn from Mexican women working as professionals, community activists, etc. addressing various environmental, economic and social problems in Mexico.

## Research Experience

- Coral Reef Monitoring in Providenciales, Turks and Caicos Islands
- Dynamic modeling of foraging strategies in *Argyrodes trigonum*
- Behavior and ecology of stream dwelling spiders
- Developmental and ecological influences on the behavioral interactions between *Argyrodes trigonum* and several species of its host
- Salticid learning behavior and cognitive ecology
- Determination of non-chitonous biomass/length relationships as a measure of available food
- The effects of host colony size, prey availability, and prey size on kleptoparasite success in colonies of *Anelosimus eximius*
- Differences in web-spider communities associated with old-field communities in southwest Ohio
- The influence of environment, heredity, and juvenile experience on the social structure of the Mexican social spider, *Metepeira spinipes*
- Phenotypic flexibility and genetic variation in a life history character of the filmy dome spider

## Publications

- Martinson, S., Cook, D. and K.R. Cangialosi. (in prep). Overwintering and use of streams for dispersal in *Cicurina* sp. (Dictyniidae). To be submitted to the Journal of Arachnology.
- Whitehouse, M., Agnarsson, I., Miyashita, T., Smith, D., Cangialosi, K., Masumoto, T., Li, D., and Y. Henaut. 2002. *Argyrodes*: phylogeny, sociality and interspecific interactions- a report on the *Argyrodes* symposium, Badplaas 2001. Journal of Arachnology 30:238-245.
- Cangialosi, K.R. 1997. Foraging versatility and the influence of host availability in *Argyrodes trigonum* (Araneae: Theridiidae). Journal of Arachnology 25:182-193.
- Cangialosi, K.R. 1991. Attack strategies of a spider kleptoparasite: effects of prey availability and host colony size. Animal Behaviour 41: 639-647.
- Cangialosi, K.R. 1990. Kleptoparasitism in colonies of the social spider, *Anelosimus eximius* (Araneae: Theridiidae). Acta Zoologica Fennica 190:51-54.
- Cangialosi, K.R. 1990. Life cycle and behavior of the kleptoparasitic spider, *Argyrodes ululans* (Araneae: Theridiidae). Journal of Arachnology 18:347-358.
- Cangialosi, K.R. 1990. Social spider defense against kleptoparasitism. Behavioral Ecology and Sociobiology 27:49-54.
- Cangialosi, K.R. 1989. Differences in web-spider communities associated with three old-field communities in southwest Ohio. Ohio Journal of Science 89(4):88-92.
- Cangialosi, K.R. and G.W. Uetz. 1987. Spacing in colonial spiders: effects of environment and experience. Ethology 76:236-246.
- Uetz, G.W. and K.R. Cangialosi. 1986. Genetic differences in social behavior and spacing in populations of *Metepeira spinipes*, a communal territorial orb weaver (Araneae: Araneidae). Journal of Arachnology 14:159-173.

### **Contributed Paper Presentations (last 10 years)**

- \*The effects of *Argyroides trigonum* on host spider relocation. Presented at the American Arachnological Society National Meeting at the University of California, Berkeley. 2008
- Ontogenetic shifts in foraging in *Argyroides trigonum*. Presented at the XVI International Congress of Arachnology in Ghent, Belgium. 2004
- \*Ontogenetic changes in the foraging behavior of *Argyroides trigonum*. Presented at the National meeting of the Animal Behavior Society in Salt Lake City, Utah. Co-authored with Michelle Osgood (undergraduate collaborator). 2003
- \*Overwintering and dispersal in streambank spiders. Presented at the American Arachnological Society National Meeting in Riverside, California. 2002
- Foraging versatility in a web-invading spider and host interactions. Invited speaker in the Dept. of Entomology seminar series at the University of Massachusetts, Amherst. 2001
- Argyroides trigonum* foraging versatility and influences on host populations. Presented at the XV International Congress of Arachnology in Badplaas, South Africa as an invited speaker in the *Argyroides* symposium. 2001
- \*Spiders in the Drift. Presented at the Northeast Regional Animal Behavior Meeting at C.W. Post - Long Island University in Brookville, New York. Co-authored with David Cook and Sharon Jensen Martinson (undergraduate collaborators). 2000
- \*Spiders in the Drift. Presented at the American Arachnological Society National Meeting, St. Augustine, Trinidad (University of the West Indies). Co-authored with David Cook and Sharon Jensen (undergraduate collaborators). 1999
- The relative importance of developmental status versus size in affecting the foraging mode of *Argyroides trigonum*. Presented at the XIV International Congress of Arachnology/22nd Annual Meeting of the American Arachnological Society, Chicago, IL. 1998
- \*The effects of hunger on a web-invading spider. Presented at the Northeast Regional Animal Behavior Society Meeting, Woods Hole, MA. Co-authored with Jeff Budzik (undergraduate collaborator). 1997
- The influence of host species on foraging strategy in a web-invading spider. Presented at the National Meeting of the Animal Behavior Society, Flagstaff, AZ. 1996
- Host species influences foraging behavior in *Argyroides trigonum*. Presented at the American Arachnological Society National Meeting, Tucson, AZ. 1996
- Twenty-two other paper presentations from 1989-1995.

\*Indicates co-authorship with undergraduate student(s)

### **Recent Competitive Grants Received**

- Strategic Initiative Grant for Microscopes, \$220,000
- Marion and Jasper Whiting Foundation Fellowship. \$5,970
- Eleven Faculty Development Research Grants, Keene State College (1994-present) \$700-\$3,000
- Bahamian Field Station Grant to participate in marine tropical studies workshop. \$400

### **Academic and Community Leadership experience**

- Biology Department Chair
- Women's Studies Program Coordinator
- Multicultural/Diversity Council Budget Manager
- American Arachnological Society, Treasurer
- Co-chair of organizing committee for the Keene State College Fourth Biennial World Affairs Symposium entitled, Globalization: Impact on Peoples of the World, Nov 3 – 5, 2005.
- Co-chair of the President's Commission on the Status of Women
- Hosted the 4-day, 2001 National Conference of the American Arachnological Society
- Co-chair, Southwest NH chapter of GLSEN (gay, lesbian and straight education network)

### **Faculty Search committees**

- Neurobiologist Search Committee, Physiologist Search Committee, Developmental Biologist Search Committee, Developmental Biologist II Search Committee, Plant Systematist Search Committee, Botanist Search Committee, Microbiologist Search Committee, Community Ecologist Search Committee, Molecular Biologist Search Committee, Women's Studies Faculty Search Committee

### **Other college/community service**

- Campus Commission on the Status of Diversity and Multiculturalism
- Keene State Safe Zone, Chair
- Women's Studies Council
- Environmental Studies Steering Committee
- President's Commission on the Status of Women, Chair
- College Assessment Committee
- College Senate Executive Committee (Executive Secretary)
- College Budget Advisory Committee
- Facilities Planning Committee
- Campus Coordinator for New England Board of Higher Education Science/Engineering Academic Support Network for minority students
- Council for a Sustainable Future
- Supplemental Instruction Program
- Writing Across the Curriculum Task Force
- Wrote the Biology section of the writing across the curriculum manual
- Wrote the Biology department assessment plan
- Wrote the Biology department student advising guidelines
- Emcee for President's Commission on the Status of Women Banquet
- Director of KSC Greenhouse
- World AIDS day activities
- International Women's day activities
- Multicultural Luncheon Series Presentation
- Co-director of Girls in Science Summer Institute
- Faculty Advisor for KSC pride
- Faculty Advisor for Tri-Beta, Biological Honor Society
- Faculty Advisor for the Feminist Collective
- Presented numerous informal lectures and slide presentations (rainforest ecology, insects and spiders, Peru and the Incas) at local schools and community organizations.
- Presented numerous GLBT trainings at area K-12 schools and KSC.
- Hosted Kevin Jennings (GLSEN national executive director) and organized program on teaching respect for area guidance counselors, teachers, and KSC and Keene communities.

### **Related Skills**

- Good reading and moderate speaking knowledge of Spanish
- Computer experience: Extensive experience with database, graphics, statistics and dynamic modeling programs including SAS, EXCEL, JMP, STELLA, etc.
- SCUBA certification, PADI Rescue diver

**Curriculum Vitae**  
**Kristen E. Porter-Utley, Ph.D.**

Assistant Professor, Biology  
Keene State College  
229 Main Street, Keene, NH 03435  
Telephone: 603-358-2576  
E-mail: [kporterutley@keene.edu](mailto:kporterutley@keene.edu)

Home Address: 652 Route 13 S, Milford, NH 03055  
Home Telephone: 603-673-2289

**Education:**

Ph.D., University of Florida, Botany, 2003

Dissertation: Revision of *Passiflora* subgenus *Decaloba* supersection *Cieca* (Passifloraceae)

Faculty advisor: Walter Judd

Advisory committee: John MacDougal, Hugh Popenoe, Pam Soltis, and Norris Williams

M.S., University of Florida, Botany with a minor in Anthropology (Specialization in Ethnobotany), 1997

Thesis: *Santeria*: an ethnobotanical study in Miami, Florida, USA

Faculty advisor: David Wigston

Advisory committee: Walter Judd, Laura Snook, and Brian Du Toit

B.S., University of Florida, Environmental Horticulture, *cum laude*, 1993

**Work Experience:**

*Keene State College, Keene, NH 03435*

Assistant Professor of Biology, 8/04-present

Courses: Ethnobotany, Evolution, Life: Diversity, Life: Diversity Lab, Plant Biology, Plants in Human Affairs, Plant Systematics, Plant Evolution, The Science and Literature of Plants

**Professional Societies and Organizations:**

The American Association of Plant Taxonomists

The Botanical Society of America

The New England Botanical Club

The New England Wildflower Society

Passiflora Society International

**Publications:**

Porter-Utley, K. 2007. *Passiflora tacanensis*, a new species of *Passiflora* subgenus *Decaloba* supersection *Cieca* from México. *Brittonia* 59(1): 25-28.

*In Press*: Porter-Utley, K. *Santeria: an ethnobotanical study in Miami, Florida, USA*. In "Building Bridges with Traditional Knowledge: Linking Indigenous People, Conservation and Ethnoscience" (B. Bennett and A. Paul, eds.). Columbia University Press.

*In Prep*: Porter-Utley, K. A phenetic analysis of the *Passiflora coriacea* complex, with a description of the new species, *Passiflora megacoriacea*. To be resubmitted to *Systematic Botany*.

*In Prep*: Porter-Utley, K. Revision of *Passiflora* subgenus *Decaloba* supersection *Cieca* (Passifloraceae). To be submitted to *Systematic Botany Monographs*.

## **Presentations:**

### *Professional Meeting:*

Porter-Utley, K. (presenter), S. Krosnick, and L. McDade. 2008. Untangling the Passionflower Vines: Preliminary Insights on the Phylogeny of *Passiflora* subg. *Decaloba* Based upon ncpGS Sequences. Botany 2008, Vancouver, Canada, 2008.

### *Invited:*

Porter-Utley, K. 2005. The Apetalous Passion Flowers: Phylogenetic Relationships within *Passiflora* L. Supersection *Cieca* (Passifloraceae). Department of Plant Biology, University of New Hampshire, Durham, New Hampshire.

## **Posters:**

### *Professional Meeting:*

Georgian, L. (presenter - KSC undergraduate) and K. Porter-Utley. 2008. A New Molecular Phylogeny for the Apetalous Passionflowers (*Passiflora* subgenus *Decaloba* supersection *Cieca*). Botany 2008, Vancouver, Canada.

## **Current Projects:**

*REVSYS Collaborative Research: Untangling the passionflower vines: phylogeny, species diversification, and character evolution in Passiflora subg. Decaloba (Passifloraceae).* *Passiflora* represents a diverse group of more than 560 species of vines and trees primarily found in Central and South America. These plants are best known as the source of tropical passionfruit, but are also widely cultivated for their beautiful, complex flowers. Passionflowers appear to be a recently-evolved lineage that has experienced rapid species diversification. Many species are poorly understood with regard to morphology, geographical distribution, and conservation status, especially in the largest lineage of passionflowers, subgenus *Decaloba*, with 235+ species. This study will synthesize modern and traditional approaches to address these problems, using DNA sequence data, scanning electron microscopy, and observation of fresh and preserved specimens. Field work will enable collection of fresh material and documentation of species distributions. This project will yield a revision of all species in *Decaloba*, and will provide a modern evolutionary framework within which to address questions about the evolution of floral shape, pollination syndromes, floral development, and the biogeographical history of the lineage. This study will address important biological and evolutionary questions in an especially charismatic group of plants. Undergraduate and graduate students will participate in the research. Undergraduates at Keene State College and Harris-Stowe State University, institutions that primarily enroll underrepresented groups in the sciences, will especially benefit from involvement in this study. Summer workshops at Rancho Santa Ana Botanic Garden will involve students from the local community. Field expeditions will build international collaborations among U.S. scientists and colleagues in Mexico, Central America, and South America. All results of this project will be available through a website hosted by the Missouri Botanical Garden.

*Passiflora* Treatment for *Flora Ilustrada de la Península de Yucatán Mexicana*, ed. Germán Carnevali, Centro de Investigación Científica de Yucatán, Mérida, México. The *Flora Ilustrada de la Península de Yucatán Mexicana* is a diagnostic flora, heavily illustrated, and aimed toward easy identification of plant material from the area covered. In addition to being useful for general botanical practice, we intend it to be of use to agronomists, ecologists, and tourists. Another goal of the Flora is to become the standard manual for administrators and natural resource managers who have to use the names of plant taxa and their distributions for management and conservation projects.

## **Awards and Grants:**

Jorgensen, P., S. Krosnick, L. McDade, J. MacDougal, and K. Porter-Utley. 2007-2010. National Science Foundation Revisionary Syntheses in Systematics (REVSYS), total of \$1,226,210, \$188,482 to KSC

Strong, S., L. Launen, K. Porter-Utley, S. Whittemore. 2005. LI-COR® Biosciences Genomics Education Matching Fund Program, Biology Department received LI-COR 4300 DNA Analysis System

Gebauer, R. K. Featherston, K. Porter-Utley. 2005. KSC Alumni Association Grant, \$1,200

Gebauer, R., K. Featherston, K. Porter-Utley. 2005. Pepsi-KSC Partnership Grant, \$500

**Institutional Service:**

Curator, Keene State College Herbarium, 2004-present  
At-Large Member of the Keene State College Senate, 2005-2008  
Advisor, Keene State College Biology Club, 2005-2008  
Member, Academic Excellence Conference Committee, Keene State College, 2007-2008  
Sponsor and Mentor, 2008 Academic Excellence Conference, Keene State College  
Sponsor and Mentor, 2007 Academic Excellence Conference, Keene State College  
Sponsor and Mentor, 2006 Academic Excellence Conference, Keene State College  
Sponsor and Mentor, 2005 Academic Excellence Conference, Keene State College

**Community Service:**

Member, Monadnock Ecological Research Collaborative, 2006-2007  
Board Member, Ashuelot Valley Environmental Observatory, 2005-present

**International Field Experience:**

2008. *México* (4 states). Field work (3 weeks) to collect Passifloraceae. Visited 3 herbaria. Collaborated with scientists, including graduate and undergraduate students and faculty, at: Herbario Centro Interdisciplinario de Investigación para el Desarrollo Integral Regional Instituto Politécnico Nacional, Oaxaca; Herbario Eizi Matuda, Escuela de Biología, Universidad de Ciencias y Artes de Chiapas, Tuxtla Gutiérrez, Chiapas; Herbario Instituto de Ecología, A.C., Pátzcuaro, Michoacán; Jefatura de Biología, Facultad de Estudios Superiores Universidad Nacional Autónoma de México, México.





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**Degrees Held:** Ph.D., Physiology, Dartmouth College, 1991  
M.S., Wildlife Biology, Utah State University, 1984.  
B.S., Wildlife Biology, S.U.N.Y. College of Environmental  
Science and Forestry and Syracuse University, 1975

**Positions Held:** Professor of Biology, Keene State College (2002 – present)  
Associate Professor of Biology, Keene State College (98 - present)  
Biology Chair, Keene State College (1996-98, 2001-02, Fall 2008)  
Assistant Professor of Biology, Keene State College (1993-98)  
Postdoctoral Fellow in Physiology, Dartmouth College (1991-93)  
Co-director of Biology Teaching Laboratories, Dartmouth  
College (1984-85)  
Research Technician, Dartmouth College (1983-84)  
Wildlife Biologist, U.S. Fish and Wildlife Service, Logan  
UT, (1980-83)

**Grants:** Keene State College Faculty Development Grant (2006) \$5,000  
Keene State College Faculty Development Grant (2005) \$5,000  
NIH BRIN Grant (2003-2005) \$24,000  
NSF-MRI (Major Research Instrumentation) Grant (2001)  
\$169,265  
Keene State College Faculty Development Grant (2001) \$3,365  
Keene State College Faculty Development Grant (2000) \$5,000  
Keene State College Faculty Development Grant (1999) \$5,000  
Keene State College Faculty Development Grant (1998) \$5,000  
Keene State College Faculty Development Grant (1997) \$1,000  
Keene State College Faculty Development Grant (1996) \$1,716  
Keene State College Faculty Development Grant (1995) \$1,760  
Keene State College Presidential Mini-Grant (1994) \$500

**Awards:** KSC Outstanding Women of New Hampshire Award recipient  
1999  
"Excellence in Teaching" Awards, Dartmouth Medical School,  
1989 and 1990  
NIH-NRSA "Ontogeny of the Types I and III Iodothyronine  
Deiodinases" (1 F32 DK0867-01) (1991-94)

**Appointments:** State of New Hampshire Pesticide Review Board (1996-2011)  
Keene Conservation Commission (2006 – 2012)  
Keene Natural Resources Inventory Ad-Hoc Committee (2008-present)  
Keene Stearns Hill Land Management Plan Ad-Hoc committee (2006-present)  
Keene Greater Goose Pond Forest Management Plan Ad-Hoc Committee (2005 – 2007)  
Faculty for the 21st Century, Class of 1997, Project Kaleidoscope (1997 - present)

**Professional Memberships:** American Association for the Advancement of Science  
American Physiological Society  
Society for Comparative and Integrative Biology  
American Association of University Women  
Association for Women in Science

**Publications:**

**Books:**

Whittemore, S. 2009. The Human Body: How it Works: The Circulatory System. Chelsea House/ Infobase Publishing. 120 pp.

Whittemore, S. 2009. The Human Body: How it Works: The Respiratory System. Chelsea House/ Infobase Publishing. (in press)

**Papers:**

Knowlton, F. and S. Whittemore. 2001. Pulp cavity-tooth width ratios from known-age and wild-caught coyotes determined by radiography. Wildlife Soc. Bull. 29(1):239-244.

Chen, C., K.B. Sillett, C. L. Folt, S.L. Whittemore, and A. Barchowsky. 1999. Molecular and demographic measures of arsenic stress in *Daphnia pulex*. Hydrobiologica. 401: 229-238.

Welsford, I.G., S.L. Whittemore, and A. Mountcastle\*. 1996. Evidence for involvement of HSP60 and c-Fos genes in osmoregulation in *Heteroclitus fundulus*. Bull. MDIBL 36: 23-24.

Croteau, W., S.L. Whittemore, M.J. Schneider, and D.L. St. Germain. 1995. Cloning and expression of a cDNA for a mammalian type III iodothyronine deiodinase. J. Biol. Chem. 270: 16569-16575.

Whittemore, S.L., M.K. McLaughlin, and K.P. Conrad. 1994. *In vitro* and *in vivo* assessment of endothelium-derived relaxing factor activity during rat gestation. Hypertension and Pregnancy 13: 227-244.

Conrad, K.P. and S.L. Whittemore. 1992. NG-monomethyl-L-arginine and nitroarginine potentiate pressor responsiveness of vasoconstrictors in conscious rats. Am. J. Physiol. 262: R1137 - R1144.

Whittemore, S.L., J. Bodwell, and C.R. Wira. 1990. Characterization of secretory component from rat uterine fluid. Adv. Mucosal Immunity 3: 602-05.

Galton, V.A., D.L. St. Germain, and S.L. Whittemore. 1986. Cellular uptake of 3,5,3'-triiodothyronine and thyroxine by red blood cells and thymus cells. Endocrinology 118: 1918-23.

Wurster-Hill, D.H., O.G. Ward, H. Kada, and S. Whittemore. 1986. Banded chromosome studies and B chromosomes in wild-caught raccoon dogs *Nyctereutes procyonoides viverrinus*. Cytogenet. Cell. Genet. 42: 85-93.

Whittemore, S. and A. Moen. 1980. Composition and *in vitro* digestibilities of various summer foods of white-tailed deer. Can. J. Anim. Sci. 60: 189-192.

#### **Abstracts:**

Nielsen, P. A., C.A. Leger, I. G. Welsford, and S. L. Whittemore. 1998. An Integrated Laboratory and Field Experience for Non-science Majors: 500 Million Years of Earth History at Turners Falls, Massachusetts, Poster Presentation, PKAL Workshop "What Works: Alternatives to Lecture-Based Learning in Math and Science", Wheaton College. June 4, 1998.

Nielsen, P. A., C.A. Leger, I.G. Welsford, and S.L. Whittemore. 1998. A Hands-on Group Laboratory Activity: Introduction to the Rock Cycle and Classification of Rocks, Demonstration, PKAL Workshop "What Works: Alternatives to Lecture-Based Learning in Math and Science", Wheaton College. June 4, 1998.

Croteau, W., S.L. Whittemore, M.J. Schneider and D.L. St. Germain. 1994. Identification of a cDNA for the Rat Type III Iodothyronine 5-Deiodonase (5DIII) 68th Meeting of the Am. Thyroid Assn. Abst. #13.

Whittemore, S.L., S. Greene\*, V.A. Galton and D.L. St. Germain. 1993. Characterization of an iodothyronine 5-deiodinase (5D) present in *Xenopus laevis* oocytes. 67th Meeting of the Am. Thyroid Assn. Abst. #67.

Whittemore, S.L., W. Dittrich, V.A. Galton, and D.L. St. Germain. 1992. Assessment of the relative 5-deiodonase (type III) mRNA levels in rat tissues. 66th Meeting of the Am. Thyroid Assn. Abstr. #24.

Whittemore, S.L. and K.P. Conrad. 1991. *In vivo* assessment of endothelium-derived relaxing factor (EDRF) activity during rat pregnancy. FASEB J. #.

Whittemore, S.L. and K.P. Conrad. 1990. N<sup>G</sup>-Monomethyl-L-Arginine (NMA): *in vivo* and *in vitro* characterization. FASEB J. #.

Whittemore, S.L. and K.P. Conrad. 1989. Stimulation of cyclic guanosine 3',5'-monophosphate (cGMP) production by methacholine differs in aorta from pregnant and virgin rats. Physiologist 32(4): 186.

Wira, C.R., C.P. Sandoe, M.G. Steele and S.L. Whittemore. 1988. Influence of uterine immunization on the presence of secretory component, IgA and IgG antibodies in uterine secretions. FASEB J. #6823.

Whittemore, S.L., J.C. Leiter and S.M. Tenney. 1988. Lack of acclimatization to chronic hypobaric hypoxia in the cockroach. FASEB J. #3794.

(note: asterisks indicate undergraduate collaborators)

**Other presentations:**

Benay, P., S. Whittemore, and L. Millard. "Improving students' writing: from individualized faculty concerns to a campus-wide commitment" NHCUC Conference, Keene State, Sept. 1996.

Whittemore, S. and K. Cangialosi. "Girls in the Middle" KSC Women's History Month Brown Bag presentation. March 1997.

**Sponsored undergraduate presentations (all supported by individual KSC undergraduate research grants):**

Halsey, J. and S. Whittemore. Effects of the pesticide bifenthrin on gastrointestinal tract morphology in metamorphosing *Xenopus laevis* tadpoles. Northeast Undergraduate Research and Development Symposium (ME) March 2009. (also presented at Academic Excellence Conference, Keene State College, April 2009)

Brown, J-L., N. Strizzi\*, J. Gormley and S. Whittemore. Developmental toxicity of the pesticide bifenthrin on *Xenopus laevis* tadpoles. Northeast Undergraduate Research and Development Symposium (ME) March 2009. (also presented at Academic Excellence Conference, Keene State College, April 2009)

Hideriotis, K. K. Bergman and S. Whittemore. Effects of endocrine-disrupting chemicals on the vocalizations of *Xenopus laevis* adults. Northeast Undergraduate Research and Development Symposium (ME) March 2009.

Beckta, J., A. Hollar and S. Whittemore. Behavioral and morphological effects of bifenthrin on *Xenopus laevis* tadpoles. National Council on Undergraduate Research Annual Conference. Salisbury, MD. April 2008.

Beckta, Jason. (currently an MD/PhD candidate at Virginia Commonwealth University) Behavioral and morphological effects of bifenthrin on *Xenopus laevis* tadpoles. Academic Excellence Conference. Keene State College. March 2008.

Hollar, Amy. (currently a Ph.D. candidate at University of Cincinnati) Development of an *ex vivo* bioassay using *Xenopus laevis* tadpoles for assessing thyroid hormone disrupting effects. Academic Excellence Conference. Keene State College. March 2008.

Johnson, Karen. "Teaching Heredity in an Elementary Classroom" Academic Excellence Conference April 2002

Shanks, Julie, Chris Watt, and Gene Garcia. "Molecular Analysis of *Daphnia magna* Stress Genes" Academic Excellence Conference April 2002.

Pinsonneault, Todd. "The Effect of Water Restriction on the Slug *Limax maximus*" Academic Excellence Conference April 2001.

Torra, James. "Chemoreception Unit Plan" Academic Excellence Conference April 2001

Fischer, Dawn. "Identification of a Novel Molecular Marker in *Daphnia magna*" Academic Excellence Conference April 2001

Piispanen, Amy "Developmental and Ecdysone Regulation of HSP90 Expression in *Daphnia magna*" April 2001

Gitchell, H., N. Hoginski, and D. Tepe. "Development of an HSP 83 probe for screening a genomic library using the species *Daphnia magna*. 55th Eastern New England Biological Conference, Colby-Sawyer College, 26 April 1997.

Key, S. "Primary culture and characterization of *Daphnia magna* cells" Northeast Regional TriBeta Conference (Biology Honor Society), Farmington, ME, April 1997

Elkins, K. "Characterization of primary cell cultures of *Daphnia magna* eggs to assay for toxicological effects of chlorine" Northeast Regional TriBeta Conference, Farmington, ME, April 1997.

#### **Recent conferences:**

Gordon Research Conferences: on Endocrine Disruption Summer 2008 (Waterville Valley NH) and 2006 (New London NH)

St. Louis University Forensic Science Education Conference. St. Louis, Mo. 2002.

NH Campus Compact KSC representative to the Chair Think Tank on Service Learning 2001-2002

Project Kaleidoscope Workshop Science for all Students: Biology, Alta, Utah July 2001  
American Association for Higher Education "1998 Forum on Exemplary Teaching",  
Atlanta, Georgia, March 21-24, 1998.

Project Kaleidoscope Faculty for the 21st Century National Assembly, Houston, TX,  
November 14-16, 1997.

Project Kaleidoscope "Interdisciplinary Approaches to Teaching Undergraduate Science and Mathematics", Colby College, Waterville, ME October 25-27, 1996

The 1996 AAC&U Science Institute "Interdisciplinary General Education Science Programs", St. Michael's College, Colchester, VT June 15-20, 1996

**Grant Review:**

NSF Review Panel: STEM program. Summer 2002.

**Textbook Review and Writing Experience**

Contributor of Chapters (Water and Electrolyte Balance in Animals, Gas Exchange and Circulation, and Animal Reproduction) to Animal Physiology Unit of Biological Science by Scott Freeman, Prentice Hall, released Spring 2002

Contributor of CD-ROM animations, test bank questions, and other text-related media to Biological Science by Scott Freeman, Prentice Hall, released Spring 2002

Numerous textbook reviews (Animal Physiology, Anatomy and Physiology, Introductory Biology, and Genetics texts) (1996 – present)

Regents Exam Question Contributor: (1999 – present)

**Relevant Courses Taught at KSC**

Cells and Physiology	Endocrinology & Endocrine Disruption
Comparative Animal Physiology	Human Anatomy & Physiology I and II
Ecophysiology (of animals)	Physiology of Plants and Animals
Research Methods	Experimental Physiology
Biochemistry	Introductory Biology (for majors)
Topics Courses for Non Majors (Thinking and Writing, Genetics and Society, Human Biology, Biology of the Human Female, Integrated Science)	

**Graduate Advisor:** K.P. Conrad

**Postdoctoral Advisors:** D.L. St. Germain, V.A. Galton

## CURRICULUM VITAE

LOREN A. LAUNEN, PhD.

Assistant Professor

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603-358-2574

[llaunen@keene.edu](mailto:llaunen@keene.edu)

### Education

PhD. Simon Fraser University, BC, Canada; Biological Sciences, (Environmental Microbiology), 1999.

B.Sc. Hons. University of Guelph, ON, Canada, Biomedical Toxicology, 1992

### Professional History

Keene State College, Keene NH, Assistant Professor of Biology, August 2005 - present

Maryville College, Maryville, TN, Visiting Assistant Professor, August 2004 – July 2005

GeoSyntec Consultants, Knoxville, TN, Senior Staff Scientist, April 2002 – August 2004

IT Corporation, Knoxville, TN, Coordinator of Biotechnology Laboratory, Sept. 2001-March 2002

Cook College, Rutgers University, New Brunswick, NJ

Post-Doctoral Associate, 1999-2001 (Dr. Max Häggblom, mentor)

Part-time Lecturer, Dept. of Biochemistry and Biochemistry, 2000-2001

Simon Fraser University, Burnaby, BC, Canada,

Ph.D. Student, Dept. of Biological Sciences, 1993-1999

Teaching Assistant, Dept. of Biological Sciences, 1993–1996

Morrow Environmental Consultants Inc. of Burnaby, BC, Canada, Student Intern, through the GREAT

Fellowship Program, 1996–1998

University of Guelph, Guelph ON, Canada, Lab Technician, Biomedical Toxicology Laboratory,  
summer 1992

University of Guelph, Guelph ON, Canada, Lab Technician, full-time summer, part-time fall/winter,  
Sperm Physiology Laboratory, 1990-1991

### Professional Affiliations

American Society of Microbiology

American Chemical Society

### Grants/Awards (since joining KSC)

*Submitted/In Progress:* Partner Institution Research Projects Grant Submission for Pilot Project within the New Hampshire Idea Network of Biomedical Research Excellence (NH-INBRE) Grant Application. July 2009. Pilot Project P6: A Molecular Characterization of the Structure and Function of Aromatic Hydrocarbon Degrading Microbes Present in the Tidal Wetlands of the Great Bay Estuary, NH, requested \$114,064 within the context of a state-wide application to the National Institutes for Health for approximately \$17M in funding to promote the development of training in the biomedical sciences for NH students. This effort was coordinated by Dartmouth College and USNH.



*Awarded: American Chemical Society Project SEED 2008 – Summer 1, and Summer 2 Awards, Summer 2008. Co-Coordinator /Applicant with C.D. Abernethy of KSC Chemistry Dept. \$2500 Summer 1, \$3000 Summer 2. KSC provided matching funds (total of \$5500). Awarded for supplies and student stipends to allow economically disadvantaged high school students (4 total) to pursue scientific research for one summer.*

*Awarded: Keene State College Alumni Association Grant (\$500.00, awarded Fall 2007). Awarded for continued development of Microbial Fuel Cells for teaching application.*

*Awarded: Keene State College President's Council for a Sustainable Future Grant (\$492.74, awarded Spring 2007). Awarded for development of preliminary Microbial Fuel Cells for teaching application.*

#### **Grants Awarded to Student Mentees (at KSC)**

Keene State College Undergraduate Research Grants. 6 awards, 6 student grant applications (Elizabeth Upsall, Lara Houghton-Robinson, Andy Consiglio, Cyndi Magnuson, Jeff Holway, David Gutierrez), various semesters, 2006 – 2009.

#### **Awards (awarded prior to joining KSC)**

Trans-Atlantic Environmental Biotechnology Fellowship; Aug. 2001 (declined)

B.C. Science Council GREAT Fellowship; 1996 –1999

Jumpstart Scholarship in Environmental Studies (SFU); 1996

NATO Research Travel Grant (TNO, Rijswijk, NL); 1995

Graduate Research Fellowship (Simon Fraser University); 1995

#### **Certifications and Short Courses**

SFU Teaching Center Instructional Skills Workshop I Certification; July, 1996

OSHA Hazwoper 40 hr and annual 8 hr (not current)

CPR and First Aid (not current)

Biodegradation of Reducible Metals, Battelle Short Course, June, 2001

SETAC Short Course: "Integrated Design of Constructed Wetlands", Nov. 1999

#### **Community Service**

Northeast Mountain Biking Association Brattleboro-Keene Chapter, Secretary (April 2009 – present)

Project SEED Mentor, American Chemical Society, (35 hrs per week, volunteer, Summer 2008)

(occasional) Reviewer, FEMS Microbial Ecology (as requested)

(occasional) Participant, Ashuelot River Local Advisory Committee (as requested for professional expertise)

## Publications and Presentations

\*Note, Undergraduate, graduate and high-school students are presented in bold font, presentations by student mentees at conferences specifically for students are in their own category below.

### Publications (Peer-Reviewed Journals)

Launen, L.A., **J. Dutta**, **R. Turpeinen**, **M.E. Eastep**, R. Doorn, **V.H. Buggs**, **J.W. Leonard** and M.M. Häggblom. Characterization of the Indigenous PAH-Degrading Bacteria of the *Spartina alterniflora*-Dominated Salt Marshes in the New York / New Jersey Harbor. 2008. Biodegradation 19: 347 – 363.

Launen, L.A., **Buggs, V.H.**, **Eastep, M.E.**, **Enriquez, R.C.**, **Leonard, J.**, Huang, J-W, Blaylock, M.J. and Häggblom, M.M. Bioremediation of Polyaromatic Hydrocarbon-Contaminated Sediments in Aerated Bioslurry Reactors. 2002. Bioremediation Journal. Vol. 6, Issue 2, pp. 125-141.

L. L. Daane, I. Harjono, S. M. Barns, L. A. Launen, N. J. Palleroni and M. M. Häggblom. PAH-degradation by *Paenibacillus* spp. and description of *Paenibacillus naphthalenovorans* sp. nov., a naphthalene-degrading bacterium from the rhizosphere of salt marsh plants. 2002. International Journal of Systematic and Evolutionary Microbiology. 52: 131-139.

Launen, L.A., Pinto, L.J., Percival, P. W., **Lam, S.F.S.** and Moore, M.M. Pyrene is metabolized to bound residues by *Penicillium janthinellum* SFU403. 2000. Biodegradation. 11: 305-312.

Launen, L.A., Pinto, L.J. and Moore, M.M. Optimization of pyrene oxidation by *Penicillium janthinellum* using Response-Surface Methodology. 1999. Applied Microbiology and Biotechnology. 51: 510 - 515.

Launen, L., Pinto, L., Wiebe, C., Kiehlmann, E. and Moore, M. The oxidation of pyrene and benzo(a)pyrene by nonbasidiomycete soil fungi. 1995. Canadian Journal of Microbiology. 41: 477-488.

### Presentations

**A. Consiglio**, **L. Houghton-Robinson**, **A. Hollar**, **D. Napsey**, **C. Johnson**, **C. Magnuson**, D. Junge and L.A. Launen. A Characterization of the Polyaromatic Hydrocarbon Microbes Present in Sediment of a Northeastern US River Impacted by Historical Manufactured Gas Plant Operations. American Society of Microbiology 108<sup>th</sup> Meeting, Boston, Massachusetts, USA. June 2008.

**Holway, J. S.**, Goodale, K. A. and L.A. Launen. Producing Energy From a Microbial Fuel Cell Using Ashuelot River Sediment as a Fuel and Microbial Source. American Association of Physics Teachers and American Physical Society Spring Meeting. U.S. Coast Guard Academy New London, CT, April 4 – 5, 2008.

A. Rouleau, **A. Keezer** and L.A. Launen. Funny Things Are Everywhere: Explorations of Compost Microbial Diversity As a Means of Engaging Students in General Microbiology. American Society of Microbiology 107<sup>th</sup> Meeting, Toronto, Ontario, Canada. May 2007.

Hardy, L.I., Driedger, J., Bechtel, S., Launen, L. and Taylor, J. Hydrogeological characterization and natural attenuation of an LNAPL plume at a tidally influenced site. Platform presentation, Groundwater Quality 2001 3<sup>rd</sup> International Conference, June 18<sup>th</sup> – 21<sup>st</sup>, University of Sheffield, UK.

Launen, L.A., **Buggs, V.H.**, **Eastep, M.E.**, **Enriquez, R.C.**, Blaylock, M.J. and Häggblom, M.M. Indigenous versus bioaugmented microflora for bioreactor treatment of PAH-contaminated sediments. 6<sup>th</sup> International In Situ and On-Site Bioremediation Conference, Battelle. June 2001, San Diego.

Launen, L.A. Bioremediation of Polyaromatic Hydrocarbon-Contaminated Sediments in Aerated Bioslurry Reactors. Oral Presentation, Dept. of Applied Microbiology and Chemistry Seminar Series. Nov. 2000, Helsinki, Finland.

Launen, L.A., **Cigolini, J.**, Zylstra, G. and Häggblom, M.M. Characterization of PAH-degrading *Paenibacillus* spp. indigenous to the rhizosphere of salt-marsh grasses. American Society of Microbiology 100<sup>th</sup> Meeting, Los Angeles, California, U.S.A. May 2000.

Launen, L.A., Flanagan, G.C., Daane, L.L., **Habib, A.**, Häggblom, M.M. The degradation of polyaromatic hydrocarbons by bacteria isolated from the rhizosphere of *Spartina alterniflora*. (poster) Gordon Research Conference: Applied and Environmental Microbiology. Connecticut, USA. July 1999.

Launen, L.A., Percival, P., **Lam, S.**, Pinto, L. and Moore, M. Pure cultures of a *Penicillium* species metabolize pyrenequinones to inextractable products. (platform presentation). 1999. 5<sup>th</sup> International Battelle In Situ and On-Site Bioremediation Symposium. San Diego.

Hardy, L.I., Launen, L.A., Man, M.K., Moore, M.M., Thompson, I.D. Bioattenuation of an LNAPL (light non-aqueous phase liquid) plume at a tidally influenced site. Platform Presentation. 1999. 5<sup>th</sup> International Battelle In Situ and On-Site Bioremediation Symposium. San Diego.

Moore, M.M., Pinto, L., Launen, L., **Bagri, R.**, Caballer, R. and Kiehlmann, E. Polycyclic aromatic hydrocarbon oxidation by nonbasidiomycete soil fungi. Platform Presentation. 4<sup>th</sup> Battelle International In Situ and On-Site Bioremediation Symposium. 1997. New Orleans.

**Undergraduate Student Research - Presentations by Student Mentees at Student Conferences or Student Sections of Conferences:**

**D. Gutierrez** and **L. Launen**. *A Snapshot of the Bacterial Diversity in Coal Tar Contaminated Sediment of the Ashuelot River*. Northeastern Undergraduate Research and Development Symposium. Oral Presentation. University of New England, Biddeford Maine, March 28<sup>th</sup>, 2009.

**G. L. Card, J.R. Phaneuf, K. Edes, B. Neuhardt, C.D. Abernethy** and **L. A. Launen**. *A Characterization of the Polyaromatic Hydrocarbon Microbes Present in Sediment of a Northeastern US River Impacted by Historical Manufactured Gas Plant Operations*. Project SEED Poster Presentation, 40<sup>th</sup> Anniversary of Project SEED, 236th American Chemical Society Fall National Meeting, Philadelphia, August 17-21, 2008

**E. Cornellier, S. Gallagher, K. Edes, E. Neuhardt, L. A. Launen** and **C.D. Abernethy**. *New Complexes of High-Valent Vanadium Containing Didentate Imine Ligands*. Project SEED Poster Presentation, 40<sup>th</sup> Anniversary of Project SEED, 236th American Chemical Society Fall National Meeting, Philadelphia, August 17-21, 2008

**C.A. Magnuson & L.A. Launen**. *Implementaing 16S rRNA Gene Analysis for Identification of Novel Environmental Microbes at Keene State College*. 2008. Poster Presentation. Keene State College Academic Excellence Conference.

**A. Consiglio & L. A. Launen**. *Microbial Degradation of Polyaromatic Hydrocarbons by Microbes in Ashuelot River Sediment Impacted by a Former Manufactured Gas Plant*. 2008. Poster Presentation. Keene State College Academic Excellence Conference.

**J. Holway, K. Goodale & L.A. Launen**. *Producing Energy from a Microbial Fuel Cell Using Ashuelot River Sediment as a Fuel and Microbial Source*. 2008. Poster Presentation. Keene State College Academic Excellence Conference.

**Brandolo, K., Gavin, K., Johnson, C., Sawin, L., Hollar, A., Lafontaine, E., Napsey, D. & L.Launen**. *Studies of the Polaromatic Hydrocarbon Degrading Microbes in Ashuelot River Sediments Contaminated By Former Manufactured Gas Plant Waste*. Class Oral Presentation to the Ashuelot River Local Advisory Committee, Keene, NH. Oct. 2007. Note: this was a class project associated with BIO 367 Microbial Diversity.

**Keezer, A.J., Consiglio, A.L., Magnuson, C.A., Conrad, B.S., Deer, D.J., Dupre, D.E., Grainger, J.C., Holway, J.S., Loughlin, M.H., Orkins, K.L. Saucier, C.M., Schubel, A.T., Thiboult, C.J., Westcott, S.E., Rouleau, A and L. A. Launen**. *Funny things are Everywhere: A Snapshot of the Microbial Diversity in the Keene State College Compost Pile*. 2007. Poster Presentation. Keene State College Academic Excellence Conference. Note: this was a class project associated with BIO 367 Microbial Diversity.

## REFERENCES

Dr. Margo Moore, Professor  
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## Curriculum Vitae

Scott J. Strong, Ph.D.

**Institution:** Department Biology  
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(603) 358-2093 (Work)  
(813) 358-2897 (Fax)  
sstrong@keene.edu (e-mail)

**Education:** Ph.D. in Biological Science, 1995, Florida State University  
Major Professor: W. R. Ellington, Ph.D.  
Dissertation title: "Molecular Studies of Arginine Kinase Isoforms in the  
Chelicerate Arthropod, *Limulus polyphemus*."

B.S. in Zoology, 1990, Miami University, Oxford, Ohio  
Advisor/Employer: D.G. Pennock, Ph.D.

### **Professional Experience:**

7/1998-present	Assistant Professor of Biology Department of Biology, Keene State College
6/1995-6/1998	Biological Scientist (Postdoctoral Research Fellow) Department of Molecular Genetics, All Children's Hospital, Department of Pediatrics, University of South Florida (please see Research Interests for description of work experience).
1990-1995	Graduate Research Assistant (W.R. Ellington, Ph.D.) Department of Biological Science, Florida State University.
1993 (Spring)	Technical Assistant, Electron Microscopy Laboratory Department of Biological Science, Florida State University Duties included alignment and maintenance of a JEOL 1200 TEM, specimen preparation, sectioning and staining, film development, carbon coating and critical point drying.
1988-1990	Work Study Laboratory Assistant (D.G. Pennock, Ph.D.) Department of Zoology, Miami University Duties included general laboratory maintenance, culturing cell lines of <i>Tetrahymena thermophila</i> , SDS PAGE, Western blotting and cell motility assays.
1988-1990	Work Study Laboratory Assistant (G.W. Barrett, Ph.D.) Ecological Research Center, Miami University Participated in data collection and data analysis in a variety of ecological based studies ranging from vole territoriality and mating to insect diversity in legume crops.
1987-1988	Work Study Laboratory Assistant (G. Rothwell, Ph.D.) Department of Biology, Ohio University, Athens, Ohio Duties included general laboratory maintenance and preparation of acetate peels from paleobotanical specimens.

## **Research Technical Experience:**

### **Protein biochemistry**

Size exclusion, anion exchange, HPLC and affinity chromatography  
Electrophoresis (SDS PAGE, native PAGE and cellulose acetate)  
Cyanogen bromide peptide mapping  
Western blotting  
Prokaryotic recombinant protein expression

### **Molecular biology**

Nucleic acid purification and quantification (total RNA, mRNA and DNA)  
Library construction (genomic, cDNA and P1 artificial chromosome)  
Radioactive labeling and hybridization methods  
Southern blotting and Northern blotting  
PCR and RT-PCR  
Site-directed mutagenesis and nested deletion analysis  
DNA sequencing (Lambda, PAC, plasmid, M13 and PCR templates)  
Electrophoresis (FIGE, CHEF and PAGE)

### **Immunology**

Generation, purification, characterization of polyclonal antibodies  
Immunodiffusion (Ouchterlony and Mancini)  
Immunoelectrophoresis  
Indirect immunofluorescence microscopy and Immunogold TEM  
Assays (ELISA, Jerne plaque, hemagglutination and hemolysis)

### **Transmission Electron Microscopy**

Specimen fixation, dehydration, embedding, sectioning and staining  
Critical point drying  
Microscope alignment (JEOL 1200 TEM)

### **Miscellaneous**

Spectrophotometry (protein, nucleic acid and enzyme-coupled metabolite assays)  
Experience dissecting vertebrate and invertebrate organisms to obtain healthy physiological preparations for biochemical studies  
Mitochondrial isolation and respiration assays  
GCG and LI-COR sequence analysis software

## **Teaching Experience:**

- 1997 (Fall) Adjunct Faculty, Introductory Biology I, St. Petersburg Junior College  
Lectured and directed biology majors in laboratory exercises ranging from cellular physiology to animal development.
- 1997 (Summer) Adjunct Faculty (substitute instructor), Anatomy and Physiology II, St. Petersburg Junior College, Lectured and directed laboratory exercises covering the lymphatic system, respiration, and digestion.
- 1997 (Summer) Research Mentor, All Children's Hospital  
Directed two undergraduate students from the University of Florida and Boston University in summer research projects in molecular biology.

- 1996 (Summer) Research Mentor, All Children's Hospital  
Directed three undergraduate students from the University of Florida's Nursing Program, Harvard University's Honors Program and Eckerd College in summer research projects in molecular biology.
- 1994-1995 Teaching Assistant, Vertebrate Physiology (upper-level undergraduates)  
Conducted review lectures and tutored vertebrate physiology in class and during scheduled office hours as well as graded exams (3 semesters, 120 students/semester).
- 1992-1993 Teaching Assistant, Immunology (upper-level undergraduates)  
Primary duties included preparation of experimental reagents, a 30 minute lecture at the beginning of each session and assistance of the class with laboratory procedures in immunochemistry, cell-mediated immune responses and kinetics of the immune response (2 semesters, 15 students/semester).
- 1991 (Summer) Instructor, "Saturday at the Sea"  
Instructed primary and secondary students on the basics of marine ecology using both field and laboratory studies at the Florida State University Marine Lab, Turkey Point, Florida.
- 1991-1994 Guest Speaker, FSU Graduate Student Orientation  
Instructed incoming graduate students on the use of multimedia presentation in teaching biology.
- 1990-1991 Teaching Assistant, Introductory Biology (undergraduate, non-majors)  
Lectured and directed laboratory classes in general biology ranging from cell biology to ecology (3 semesters, 3 labs/semester, 25 students/section).

#### Awards and Honors:

- 1997 Research Support Grant, Suncoast Cardiovascular Research and Education Foundation (\$15,000). Title of proposal: "Gene Expression in Early Cardiac Development.", Department of Molecular Genetics, All Children's Hospital.
- 1993 Outstanding Teaching Assistant Award  
Program for Instructional Excellence, Florida State University
- 1989 Undergraduate Research Award, Department of Zoology, Miami University.  
Title of proposal: "Characterization of temperature sensitive mutations in *Tetrahymena thermophila*."

#### Committees:

- 1997 Pediatric Research Building Committee, University of South Florida, All Children's Hospital.  
Designed floor plan for new USF/ACH research facility and served as scientific consultant to architects regarding building modifications.
- 1994 Appointed by the Dean of Arts and Science to the Student Advisory Committee.  
Served as a college-wide liaison between undergraduate and graduate students and the college's faculty and administration.
- 1993 Graduate Student Committee Area 4 (physiology and cellular biology) representative.  
Served as a liaison between graduate students and the graduate studies chairperson.



## Publications:

**Strong, S.J.** and Ellington W.R., Horseshoe crab sperm contain a unique isoform of arginine kinase which is present in midpiece and flagellum., *J. Exp. Zool.*, 1993, 267:563-571.

**Strong, S.J.** and Ellington W.R., Isolation and sequence analysis of the gene for arginine kinase from the chelicerate arthropod, *Limulus polyphemus*: insights into catalytically important residues., *Biochim. Biophys. Acta*, 1994, 1206:97-104.

**Strong, S.J.** and Ellington W.R., Expression of horseshoe crab arginine kinase in *Escherichia coli* and site-directed mutagenesis of the reactive cysteine peptide., *Comp. Biochem. Physiol.*, 1996, 113B:809-816.

Kornfeld, S.J., Haire, R.N., **Strong, S.J.**, Tang, H., Sung, S., Fu, S.M. and Litman, G.W., Newly diagnosed X-linked agammaglobulinemia in a 51 year old male., *Mol. Med.*, 1996, 2:619-623.

Rast, J.P., Anderson, M.K., **Strong, S.J.**, Litman, R.L. and Litman, G.W.,  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$  T cell antigen receptor genes arose early in vertebrate phylogeny., *Immunity*, 1997, 6:1-11.

Zhou, G., Parthasarathy, G., Somasundaram, T., Ables, A., **Strong, S.J.**, Ellington, W.R. and Chapman, M.S., Expression, purification from inclusion bodies, and crystal characterization of a transition state analog complex of arginine kinase: a model for studying phosphagen kinases., *Pro. Sci.*, 1997, 6:444-449.

Haire, R.N., Ohta, Y., **Strong, S.J.**, Litman, R.T., Liu, Y., Prchl, J.T., Cooper, M.D. and Litman, G.W., Unusual patterns of upstream exon skipping associated with mutations involving the intron 17 3' splice site in Bruton's tyrosine kinase., *Am. J. Hum. Genet.*, 1997, 60:798-807.

Haire, R.N., **Strong, S.J.** and Litman, G.W., Identification and characterization of a homolog of Bruton's tyrosine kinase, a tec kinase involved in B cell development, in a modern representative of a phylogenetically ancient vertebrate species., *Immunogenetics*, 1997, 46:349-351.

Hawke, N.A., **Strong, S.J.**, Haire, R.N. and Litman, G.W., A vector for positive selection of in-frame genetic sequences., *Biotechniques*, 1997, 23(4):619-620.

**Strong, S.J.**, Ohta, Y., Litman, G.W. and Amemiya, C.T., Marked improvement of PAC and BAC cloning using electroelution of pulse-field gel-separated partial digests of genomic DNA., *Nucleic Acids Research*, 1997, 25(19):3959-3961.

Haire, R.N. and **Strong, S.J.**, Identification of genetic mutations in the primary immunodeficiency X-linked agammaglobulinemia using a LI-COR automated fluorescence sequencer., *LI-COR Seq. Bull.*, 1997, in press.

Rast, J.P., Amemiya, C.T., Litman, R.L., **Strong, S.J.** and Litman, G.W., Distinct patterns of IgH structure and organization in a divergent lineage of chondrichthyan fishes., *Immunogenetics*, 1997, in press.

Kornfeld, S.J., Haire, R.N., **Strong, S.J.**, Brigino, E., Tang, H., Sung, S., Fu, S.M. and Litman, G.W., Extreme variation in X-linked agammaglobulinemia phenotype in a three generation family., *J. Allergy and Clinical Immunology*, in press.

### Manuscripts in preparation and submitted:

Haire, R.N., **Strong, S.J.** and Litman, G.W., Tec-family non-receptor tyrosine kinase expressed in zebrafish kidney., Submitted, *Immunogenetics*, 8/1997.

**Strong, S.J.**, Hawke, N.A., Mueller, M.G. and Litman, G.W., Organization and expression of a novel family of diversified, closely linked immune-type genes in the Southern pufferfish, *Spheroides nephelus*., 1997, in preparation.

Amemiya, C.T., **Strong, S.J.**, Ohta, Y., and Litman, G.W., Close proximity of CA repeats in the genome of the Southern pufferfish, *Spheroides nephelus*., 1997, in preparation.

Anderson, M.K., **Strong, S.J.**, Rast, J.R., Litman, R.T., Amemiya, C.T., Leur, C.A. and Litman, G.W., The *Raja eglanteria* IgX locus encodes the putative novel antigen receptor NARC/IgW., 1997, in preparation.

### Abstracts:

Pennock, D.G., **Strong S.J.**, and Schwandt A., A temperature-sensitive mutation that causes assembly of cilia lacking outer dynein arms in *Tetrahymena thermophila*., *J. Cell Biol.*, 1989: 109:177a.

**Strong, S.J.** and Ellington, W.R., Arginine kinase in horseshoe crab sperm., *Am. Zool.*, 1991; 31:69a.

**Strong, S.J.** and Ellington, W.R., Cloning and sequencing of the cDNA for *Limulus* arginine kinase., *Am. Zool.*, 1995; 34:132a.

**Strong, S.J.**, Hawke, N.A. and Litman, G.W., Isolation and characterization of TCR/Ig/CD8 variable region related genes from a small genome model system the pufferfish, *Spheroides nephelus*., Suncoast Biomolecular Science Conference, 1996, 3.

Hawke, N.A., **Strong, S.J.** and Litman, G. W., Improvements in short primer PCR based identification of novel IgSF members., Suncoast Biomolecular Science Conference, 1996, 34.

Kornfeld, S.J., Brigino, E.N., Haire, R.N., **Strong, S.J.**, Tang, H., Sung, S.J., Fu, S.M. and Litman, G.W., Marked phenotypic and age variability in X-linked agammaglobulinemia., *J. Allerg. Clin. Immunol.*, 1997, in press.

**Strong, S.J.**, Mueller, G.M., Litman, R.L., Hawke, N.A., Miracle, A.L., Rast, J.P., Amemiya, C.T. and Litman, G.L., A novel family of diversified, closely linked immune-type genes in Southern pufferfish., *USF Fifth Annual Fellows Forum*, 1997, in press.

## **Non-Tenure Track Faculty**

## **Douglas E. Smith**

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E-Mail: [drdoug51@hotmail.com](mailto:drdoug51@hotmail.com) or [dsmith2@keene.edu](mailto:dsmith2@keene.edu)

### **Experience and Skills**

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**Non-Tenured Faculty. Keene State College, Keene, NH.** May 2000-August 2002; August 2003-Summer 2009. Designed, prepared and taught classes and laboratories at Keene State College for sixteen semesters and nine summers. Subjects taught were Human Anatomy and Physiology I & II (BIO 230, 231, 232, 233), Topics in Biology: Sensory Physiology (BIO 102), Topics in Biology: Human Biology (BIO 102), and Evolution and Biodiversity (BIO 101).

**Visiting Professor. Regis College, Weston, MA.** September 2002-August 2003. **Framingham State College, Framingham, MA.** May 2003-August 2003. Designed, prepared and taught classes and laboratories at Regis College for two semesters and one summer. Subjects taught were Human Anatomy and Physiology I & II (BIO 105, 106), and Microbiology Lab (BIO 108x). Designed, prepared and taught classes and laboratories at Framingham State College for one summer. Subject taught was General Biology (BIO 102).

**Program Director. YMCA Camp Takodah, Richmond, NH.** Summers of 1993-2005. Designed and implemented a curriculum of nature and science based classes for the Nature Department of YMCA Camp Takodah. Duties included teaching the classes, training staff to teach the classes, purchasing equipment and supplies, performing evaluations on the staff, attending Program Director meetings, and creating end-of-the-year reports. The classes were designed for ages 7-17.

**Coordinator for Human Anatomy. University of Rhode Island, Kingston, RI.** September 1996-May 1999. Coordinated and trained the teaching assistants of twelve Human Anatomy laboratories by arranging lab review meetings, creating and distributing tests and lab handouts, purchasing new models and equipment, collating grades for all laboratories (170+ students), and keeping grades for lecture and lab on Microsoft Excel spreadsheets.

**Teaching Assistant. University of Rhode Island, Kingston, RI.** September 1993-May 1999. Designed, prepared and ran laboratories at the University of Rhode Island for twelve semesters. The laboratories taught were Introductory Biology (BIO 102), Human Anatomy (BIO 121, 123), and Vertebrate Biology (BIO 466).

**Guest Lecturer.** Covered lecturing duties for professors by request or as a volunteer, including Human Anatomy, Herpetology, Vertebrate Biology, Ornithology, Mammalogy, and Testudines at the University of Rhode Island. Prepared and delivered hour-long lectures to multiple grade school and high school groups on numerous biology subjects including Vertebrate Biology, Local Flora and Fauna Identification, Lake and Forest Ecology, Environmental Biology, Human Anatomy, Basic Chemistry, and Basic Physics at Camp Takodah in Richmond, NH, at Jaffrey-Rindge Middle School in Jaffrey, NH, and Westmoreland School in Westmoreland, NH.

**Boston Aquarium, Boston, MA.**

Laboratory Assistant, September 1990-May 1991.

**Boston University, Boston, MA.**

Laboratory Assistant, September 1988-May 1990.

**Honors, Awards, Citations, Publications**

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**National Honor Society,** Conant High School, 1988.

**Marty Fisher Award,** Cheshire County YMCA, 2001.

**Magnetosensitivity in the Eastern Garter Snake, *Thamnophis sirtalis*,**  
Doctoral Thesis, University of Rhode Island, 2002.

**Teaching Interests**

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**Competent to teach:** Introductory Biology, Cell Biology, Microbiology, Human Anatomy and Physiology, Human Biology, Sensory Physiology, Neurobiology, Evolution and Biodiversity, Chordate Anatomy, Vertebrate Biology, Animal Behavior, Introductory Ecology, Marine Biology, Sea Turtle Biology, Snake Biology, and specialized topics in Ornithology, Mammalogy, Ichthyology and Limnology.

**Education and Training**

---

**University of Rhode Island.**

PhD. In Vertebrate Biology, May 2002.

**Boston University.**

Bachelors Degree in Marine Biology (cum laude), May 1992.

## References

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Ben Wise. Retired Professor of Biology at Keene State College.  
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Phone: 781-768-7403

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Jeff Craig. Director at the Cheshire YMCA.  
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**Todd M. Jarry, Ph.D.**

Dartmouth Medical School

Hanover, NH 03755

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[tjarry13@gmail.com](mailto:tjarry13@gmail.com)

**Education:**

---

Ph.D. Dartmouth Medical School, Hanover, NH	1999-2007
<i>Advisor: Ambrose L. Cheung</i>	

B.S. University of New Hampshire , Durham, NH	1990-1994
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**Teaching and Experience:**

---

Biology Instructor	Summer 2009
Granite State College, Claremont, NH	
Designed and instructed an introductory class on physiology and disease	

Microbiology Instructor	Spring 2009
Department of Biology, Keene State College, Keene, NH	
Designed and instructed an upper-level microbiology course with an integrated laboratory.	

Biology Instructor	Fall 2008
Granite State College, Claremont, NH	
Designed and instructed an introductory class on disease, with an emphasis on the biology and epidemiology of emerging diseases.	

Microbiology Instructor	Spring 2008/2009
Department of Biology, Keene State College, Keene, NH	
Design and instruct two integrated lecture/lab sections of an introductory microbiology course for nutrition majors.	

Biology Instructor	Fall 2006/2007
Department of Natural Sciences	
Colby-Sawyer College, New London, NH	
Designed, planned and instructed an introductory biology class of 20 (1st and 2nd year) undergraduate students.	
Organized and led a non-traditional laboratory course developed by Professor Bill Thomas Ph.D..	

**Research Experience:**

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Research Scientist : ImmRx Inc.	2008-2009
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Thesis Research : "Characterization of the interaction between <i>Staphylococcus aureus</i> and the cystic fibrosis cell line CFT-1."	1999-2007
<i>Advisor: Ambrose L. Cheung</i>	

Research Assistant : Department of Immunology 1995-1998  
Dartmouth College, Hanover, NH  
Managed and organized a research lab of 4 people.  
Synthesized, purified and developed a targeted  
bi-component molecule to help treat patients with  
prostate cancer.  
*Advisor: Michael Fanger*

Separation and Purification Technician : 1994-1995  
Creative BioMolecules (now Stryker Biotech), West Lebanon, NH  
Worked as a team member to purify various clinical grade drugs.  
Developed and implemented Standard Operating Procedures  
for research and development.  
*Advisor: Peter Garipey*

#### **Leadership Experience:**

Head Coach Youth Boys Lacrosse, Lebanon, NH	2008
Assistant Varsity Boys Lacrosse Coach, Lebanon, NH	1996-1998, 2001
Youth Alpine Ski Instructor, PSIA Level 1, Lebanon, NH	1997-1998
Olympics of the Mind Co-Coach, Lebanon, NH	1997-1998
Assistant Freshman Boys Football Coach, Lebanon, NH	1995

#### **Meetings and Presentations:**

**Jarry, T.M.** 2008 Guest Speaker at Biology Club seminar: "Characterization of the interaction between *Staphylococcus aureus* and the cystic fibrosis cell line CFT-1." Keene State College, Keene, NH

**Jarry, T.M.**, Memmi, G., Cheung, A..L 2008 Poster presentation, "The expression of alpha-haemolysin is required for *Staphylococcus aureus* phagosomal escape after internalization in CFT-1 cells." American Society of Microbiology, 108<sup>th</sup> General Meeting. Boston, MA

**Jarry, T.M.**, Cheung, A.L. 2003 Poster presentation, Intracellular Persistence Of *Staphylococcus aureus* Within a Cystic Fibrosis Tracheal Epithelial Cell Line. American Society of Microbiology, 103<sup>rd</sup> General Meeting. Washington, D.C.

**Jarry, T.M.**, Cheung, A.L. 2003 Intracellular Persistence Of *Staphylococcus aureus* Within a Cystic Fibrosis Tracheal Epithelial Cell Line. Poster presentation, Microbial Pathogenesis and Host Response. Cold Spring Harbor, NY.

#### **Memberships and Awards:**

American Society of Microbiology	2003-2007
Molecular Pathogenesis Training Grant Fellow	2003-2005

#### **Peer-Reviewed Publications:**

**Jarry, T. M.** Memmi, G., Cheung, A. L. The expression of alpha-hemolysin is required for *Staphylococcus aureus* phagosomal escape after internalization in CFT-1 cells. Cellular Microbiology 2008 10(9), 1801-1814.



**Jarry, T. M.** and Cheung, A. L. *Staphylococcus aureus* escapes more efficiently from the phagosome of a Cystic Fibrosis bronchial epithelial cell line than its normal counterpart. *Infect Immun.* 2006 May; 74(5): 2568-2577.

Bateman, B. T., Donegan, N. P., **Jarry, T. M.**, Palma, M., Cheung, A. L., Evaluation of a tetracycline-inducible promoter in *Staphylococcus aureus* in vitro and in vivo and its application in demonstrating the role of sigB in microcolony formation. *Infect Immun.* 2001 Dec; 69(12): 7851-7.

Wallace, P. K., Tsang, K. Y., Goldstein, J., Correale, P., **Jarry, T. M.**, Schlom, J., Guyre, P. M., Ernstoff, M. S., Fanger, M. W. Exogenous antigen targeted to FcγRI on myeloid cells is presented in association with MHC class I. *J Immunol Methods.* 2001 Feb 1; 248(1-2): 183-94.

Nancy E. McDade, Ph.D.  
90 Felt Road  
Keene, NH 03431

## **Professional Experience**

### **Clinical Exercise Physiologist - Cardiac Rehabilitation**

1995 to present  
New Hampshire

Cheshire Medical Center, Dartmouth-Hitchcock. Keene  
American College of Sportsmedicine Certified Clinical  
Exercise Specialist and Health Fitness Instructor

Full time program Exercise Physiologist who is responsible for all aspects of exercise programming for cardiac related specialty population in Cardiology services. Clinical intake assessments, care plan development, exercise prescription, Phase 2 monitored activity sessions, and Phase 3 maintenance program supervision. Educational presentations and consultations provided in both classroom and individual settings. Outcomes data tracking responsibility and program evaluation monitoring on numerous physiological and SF-36 parameters. CQI and program certification documentation maintained. I also provide the executive wellness physical fitness individual consultations. Healthcare provider BLS certified.

### **Leadership Experience**

2004 to present

Selected member of the Cheshire Medical Center Advocates for Healthy Youth program. I have participated in a leadership capacity responsible for the implementation of programs at a local elementary school during the current academic year that focused on reducing obesity and increasing awareness of activity and nutritional choices. I am also a member of the data analysis committee that is reviewing the lifestyle change variables that are being studied. Professional who provides guidance and oversight to the obesity weight management training therapy program called Families in Training for at risk children and families.

### **Assistant Professor and Adjunct Professor**

1992 to present

Biology and Physical Education Departments  
Keene, New Hampshire  
Keene State College

Faculty member for 33 semesters. Courses taught have included Introduction to Human Physiology, Anatomy and Physiology, (including lab instruction), Exercise Physiology, and Health Education. Teaching has ranged from full time course loads to two-courses-per semester and is ongoing. Responsible for all class preparation, grading and instruction related to the to academic standard requirements for integrated studies outcomes to include writing and research, critical thinking, and an appreciation of understanding the impact of the natural sciences on self, society and the environment.

### **Assistant Director of Health Fitness**

National Defense University  
D.C.

Washington,

Coordinated the policy, plans and programs of a comprehensive corporate executive wellness program for senior level military and government officials. Responsibilities included educational presentations, logistics, personnel, budget and contracting, and computer services. I wrote and edited clear and concise technical guides on basic programs for cardiovascular health that contained illustrations, tables, and text materials. I was accountable for the statistical framework and computerized data processing for which 500 annual individual fitness profiles, monthly diet and exercise records were collected, interpreted, and maintained.

## Education

Ph.D. and MA

University of Maryland  
Exercise Physiology and Health Education

BS

State University of New York at Cortland, graduated cum laude  
New York State Teacher Certification for Physical Education

## RESEARCH

Socially Desirable Response Bias in Cardiac Rehabilitation Patients: Implications for Treatment  
Poster presentation at AACVPR, Sept 2002 Annual Meeting

SF-36 As A Predictor of Rehabilitation Program Completion

Poster presentation submitted for inclusion at AACVPR Sept 2002 Annual Meeting

The Benefit of an Aggressive Lipid Lowering Program in Cardiac Rehabilitation

Poster Presentation Spring Symposium for Cardiopulmonary Wellness  
May 10<sup>th</sup>, 2001. New Hampshire Society for Cardiopulmonary Rehabilitation

## PUBLICATIONS

The Journal of Military Medicine, October, 1983; "The National Defense University Program: Selected Physiological Measurements at Admission and Graduation".

Microform publication of Master's Thesis, 1978; "The Relationship Between Muscular Strength and Cardiovascular Endurance as Measurements of Physical Fitness in College Women".

## PRESENTATIONS

Continuous Quality Improvement: *Senior Fitness Testing in the Rehab Setting*. Presentation to Senior Management Team, Cheshire Medical Center, September 19, 2003.

Defeating the Demons, *If Your Heart Could Talk*. Community Health Education Program, Cheshire Medical Center, November 18, 2002

*The Wealth of Wellness*. Retirement program presentation for Timken Corporation, October, 1997 and 2000.

The Air War College, Montgomery Alabama, invited guest speaker, 1983 and 1984. "Physical Fitness, Nutrition and the Executive".

The Society for Nutrition Education, guest speaker at the Rayburn House Office Building, Washington, D.C. October 14, 1984. "Promoting a Healthful Workplace – Physical Fitness".

Maryland Commission on Physical Fitness, "Physical Fitness Evaluation in the Community", December 1, 1981

## PROFESSIONAL ASSOCIATIONS

The American College of Sportsmedicine, member since 1976.

Certifications include: **Exercise Specialist** (since 1999) and **Health Fitness Instructor** (since 1995)  
Executive Board Member of the Cheshire Medical Center Advocates for Healthy Youth program

CURRICULUM VITAE AND EDUCATION HISTORY  
JULIA IMBARRATO, ADJUNCT IN BIOLOGY, KEENE  
STATE COLLEGE, KEENE, NH.

EDUCATION:

Vermont College At Norwich University  
Montpelier and Brattleboro, Vermont  
Sept. 1991 - June, 1994  
Degree: Master's of Education in Science Education  
Certification: Secondary Education in Biology and General  
Science

State University of New York at Albany  
Albany, NY  
August, 1973 - June, 1975  
Degrees: Bachelor of Arts in Biology;  
Bachelor of Arts in Philosophy

Castleton State College  
Castleton, Vermont  
August, 1971 - June, 1973 (Transferred)

Music and Art High School  
New York, NY  
Regents Diploma; Music Diploma

COURSES TAUGHT:

Secondary School Experience:

Keene High School, Keene, New Hampshire  
Fall, 1997 - Present: Taught and/or am teaching:  
Biology; AP Environmental Science; Environmental  
Science; Basic Chemistry; Oceanography; Grades 9th  
through 12th.

Hinsdale High School, Hinsdale, New Hampshire  
Fall, 1994 - Spring, 1997: Taught Physical Science,  
Health and Biology, 7th through 10th grades.

Brattleboro Union High School, Brattleboro, Vermont  
Spring, 1994: Long-term substitute for four months:  
Introduction to Physical Science, 9th Grade Honors.

Post Secondary School Experience:

Keene State College, Keene, New Hampshire

Fall, 2001 - Present ( Total of 13 semesters )

Subjects taught or currently teaching: Topics in Biology:  
New Perspectives, now INBIO199.

Anticipate teaching same in the future.

Community College of Vermont, Brattleboro, Vermont

Fall, 1994 - Spring, 1998

Subjects Taught: Introduction to Chemistry  
Introduction to Philosophy  
Nutrition

Johnson State College

Johnson, Vermont (External Degree Program,  
Springfield, VT)

Subject Taught: Stress Reduction

## Susan Elizabeth Piscopo, DVM, PhD

315 Union St.  
Peterborough, NH 03458  
6039244276  
piscopos3@comcast.net

### Objective

Adjunct faculty position in the life sciences

### Education

- 1996 PhD, Physiology and Toxicology, North Carolina State University
- 1991 DVM, North Carolina State University
- 1987 BS, Animal Science, University of Vermont, magna cum laude

### Awards and Fellowships

- 1994 Patricia Roberts Harris Fellowship  
Awarded to women and minority PhD candidates demonstrating outstanding academic performance and future promise in scientific research.
- 1994 **Outstanding Teaching Assistant Award**
- 1990 Phi Zeta Veterinary Honor Society

### Positions Held

- 2008-present Adjunct Professor, Keene State College, Keene, NH: Lecturer and laboratory instructor for the following undergraduate courses:  
BIO212 Cells and Physiology  
BIO111 Evolution  
BIO110 Cells and Molecules
- 1997-2007 Veterinary Science Writer, freelance: Researched, wrote and published peer-reviewed continuing education articles for veterinarians and health/management articles for horse owners in nationally published magazines. Wrote two monthly columns reviewing current veterinary research with clinical applications for veterinary practitioners (*Veterinary Forum: News&Views*) and horse owners (*The Horse: Research Roundup*).
- 2002 Instructor, Adult Education Program, Educational Services Commission of Morris County, Morristown, NJ: Developed an adult education program for pet owners. Topics included common illnesses in dogs and cats, small animal nutrition, and first aid for pet owners.
- 1993 Research and Teaching Assistant. North Carolina State University: Participated in the development of an undergraduate course, Companion Animal Management. Responsible for preparation and presentation of half of the lectures and associated exams.  
Additional teaching responsibilities included lecture and laboratory organization and implementation for two undergraduate courses, Reproductive Physiology and Swine Management.

**Susan Elizabeth Piscopo, DVM, PhD**

**Positions Held (cont)**

1991 Associate Veterinarian. Southern Oaks Animal Hospital, Hope Mills, NC:  
Practiced small animal and equine medicine and surgery, including emergency  
after-hours care.

**Conference Presentations**

"Addition of glucose to defined media for the development of *in vitro* produced  
bovine embryos and its effects on embryo survival" (Poster Presentation),  
Society of Toxicology Annual Meeting, Baltimore, MD, 1995.

"Effects of albendazole sulfoxide on preimplantation embryonic development,"  
Pfizer Animal Health, West Chester, PA, 1994.

**Licenses and Accreditation**

North Carolina Veterinary Medical License #3119

Federal Veterinary Accreditation, 1991

**Professional Organizations and Boards**

New Hampshire Veterinary Medical Association  
*Veterinary Forum* Executive Review Board

**References**

Tom Regan, MD.  
Trauma and Emergency Medicine  
University of Connecticut Health Centers  
860-679-3504

Peggy Walsh, PhD.  
Associate Professor of Sociology  
Keene State College  
603-358-2905

Ida Washington, DVM, PhD.  
Laboratory Animal Medicine  
Washington State University  
425-296-6353

## **Susan Elizabeth Piscopo, DVM, PhD**

### **Publications**

- "Breeding on Foal Heat." *TheHorse.com*, Mar 2007; article #9220
- "Endometritis." *TheHorse.com*, Feb 2007; article #8811
- "Research Roundup," (published monthly), *The Horse*, 2001-2005.
- "News&Views," (published bimonthly), *Veterinary Forum*, 2001-2005.
- "The A.R.T. of Breeding." *TheHorse.com*, Feb 2005; article #5464
- "Fishing For Answers in the Gene Pool." *Veterinary Forum*, February 2005; 22(2): 26-32.
- "Genetics 101." *Veterinary Forum*, October 2004; 21(10): 29-37.
- "Breath Easier." *TheHorse.com*, July 2002; article #3665
- "Advancements in Equine Embryo Production." *Equine Practice*, June 2000; 22(6): 16-20.
- "Paraneoplastic Pemphigus." *Veterinary Forum*, March 2000; 17(3):55-61.
- "Feline Retroviruses and the Skin." *Veterinary Forum*, January 2000; 17(1): 32-40.
- "Thermal Burns." *Veterinary Forum*, November 1999; 16(11):36-47.
- "The Complexities of Equine Sarcoïd Tumors." *Equine Practice*, September 1999; 21(8):14-18.
- "Canine Mast Cell Tumors." *Veterinary Forum*, June 1999; 16(6):32-41.
- "Lung Masses in a Febrile Cat." *Veterinary Forum*, May 1999; 16(5):95-96.
- "Persistent Coughing in a Cat." *Veterinary Forum*, April 1999; 16(4):79-80.
- "Drug Eruptions." *Veterinary Forum*, March 1999; 16(3):50-54.
- "Skin Complications of Rodenticide Poisoning." *Veterinary Forum*, January 1999; 16(1):54-59.
- "Comparison of effects of albendazole sulfoxide on *in vitro* produced bovine embryos and rat embryos." *American Journal of Veterinary Research*, September 1997; 58(9):1038-1042.
- "Determination of concentration of albendazole sulfoxide in plasma and uterine fluid of the heifer." *American Journal of Veterinary Research*, January 1997; 58(1):62-65.
- "Effects of albendazole sulfoxide on preimplantation embryonic development," PhD dissertation, North Carolina State University, 1996.

(reprints available upon request)



# CLIFFORD LERNER

P.O. Box 79  
Spofford, N.H. 03462  
(603) 363-4401  
Clerner@sau29.org

## EMPLOYMENT:

- **Science Teacher** - Keene H.S. (28 yrs.)  
*Subjects:* Biology, AP Biology, Molecular Genetics, Env.Science
- **Adjunct Professor** - Keene State College (6 yrs.) and Antioch/New England  
England Grad. School (7 yrs.)  
*Subjects:* Tropical Ecology, Entomology,  
Coral Reef Ecology, Concepts in Biology, Biomonitoring
- **Varsity Coach-** Alpine Skiing (6 yrs.); Nordic Skiing (7 yrs.);  
Boy's Tennis (6 yrs.); JH Basketball (1 yr.)

## EDUCATION:

- **M.S.Degree**--Environmental Science (Antioch/New England 1986)
- **B.S. Degree** --Biology (SUNY at New Paltz 1974)
- **Teaching Certificate** -- (Keene State College 1978)

## AWARDS AND PROFESSIONAL EXPERIENCE

- **NH Environmental Teacher of the Year** (1991)
- **NH Teacher of the Year Runner-up** (1993)
- **Keene Outstanding Educator Award** (2002)
- **Advisor for Envirothon Team** (eleven time NH champions)
- **Presenter at National Science Teacher's Convention**
- **Presenter at National Biology Teacher's Convention**
- **US Fish and Wildlife Service Educator's Award** (1992)
- **Master Teacher/Coordinator**--Keene Critical Skills Institute
- **Field Supervisor for Student Teachers**--(20 yrs.)
- **Recipient 1989 & 1990 Harris Center Fellowship**
- **Designed and Supervised student overseas tours** (21 years)
- **Grant to develop Recombinant DNA Lab Instruction**
- **Co-writer of a major EPA grant to develop a regional air monitoring network in local schools (AIRNET)**

## CURRICULUM DEVELOPMENT:

- Developed curriculum for an AP Biology course at KHS
- Developed curriculum for a Molecular Genetics course at KHS
- Developed curriculum for an elective course in Tropical Ecology at Keene High School. (This program has been taking a select group of students to a Caribbean field

site for the past 20 years. Previous study trips have been taken to Trinidad-Tobago, U.S. Virgin Islands, Costa Rica Panama and Belize.

- Co-writer of a regional *AirNet* program designed to develop science monitoring skills in various regional high schools and to share data and curriculum methods via the Internet.

- Recipient of the Harris Center Fellowship which provided funds to develop more outdoor educational activities for high school classes.

- Developed and implemented a successful endangered species monitoring program for a local freshwater mussel. (*Alasmidonta heterodon*)

- Coordinated Keene's Critical Skills Institutes. These were teacher training institutes designed to promote more effective classroom strategies that addressed critical skills education as well as essential knowledge.

- Presented at two National Science Teachers conventions, one National Biology Teacher convention, and numerous state and local conventions and workshops.

- Computer trainer for our school district (numerous workshops on database and spreadsheet use in science education)

- My student's research has been featured in a major textbook (Environmental Science, Karen Arms, 2002)

- I have been a reviewer of two editions of a major textbook. (Environmental Science, Karen Arms, 1996, 2002)

## **TRAVEL EXPERIENCE**

I have led student ecology trips for over 22 years to the following locales:

**Hawaii**

**Virgin Islands (3 years)**

**Ecuador**

**Costa Rica**

**Trinidad and Tobago**

**Panama (2 years)**

**Belize (18 years)**

The Belize program alone has reached over 320 students. It is an enriching educational experience that introduces students to two critically endangered ecosystems- tropical rainforests and coral reefs. Through pre-trip lectures and reading assignments, students are prepared to conduct field research projects and collaborate with Belizean scientists. They are also provided with a stimulating cultural experience as they interact with local students and their teachers in Belize.

## **Appendix 7.**

### **Raw Data Regarding Biology Student Demographics**

**(note, analysis of this data is presented in text, figures and tables within the self-assessment report)**

**THIS DATA IS INCLUDED ELECTRONICALLY ON A CD AS IT IS A MULTI-PAGE, CRUDELY FORMATTED FILE. THE CD IS LOCATED IN THE BINDER POCKET.**

**THE DATA IS PROVIDED HERE EXACTLY AS RECEIVED BY KSC IR.**

## **Appendix 8.**

### **Sample Course Syllabi**

**Professor:** Dr. Loren Launen  
**Phone, E-mail:** 358-2574, llaunen@keene.edu  
**Office Hours:** Office hours: W 12:00 – 2:00, R 4:00 – 5:00 or by appointment, office SCIC 308  
**Class Meeting Time:** 110-03 TR, 12:00 – 1:45, SCIC 332  
110-04 TR, 2:00 – 3:45, SCIC 332  
**Text:** *Biological Science*, 3<sup>rd</sup> Ed., Freeman, Pearson Prentice Hall, 2008  
ISBN 0-13-224950-2

**Course Description:** Introduction to the life processes from the molecular to the physiological level using an integrated lecture and lab experience. Topics include the chemistry of macromolecules, cell structure and function, cellular respiration, photosynthesis, and gene expression. Use of experimental inquiry to integrate course content into a physiological context. 4 credits. Fall.

**Please Note:** This course a prerequisite for all upper-level courses in the biological sciences. The information you learn in this course will serve as the foundation for the more complex concepts addressed in future courses. **This course is not intended as a course for non science majors.**

### Learning Objectives

- describe simple properties of atoms and the nature of covalent and ionic bonds, hydrogen bonds, and other weak forces
- describe the properties and importance of water and pH in biological systems
- identify and describe the structure and functions of biologically important macromolecules
- define and describe enzymes including an understanding of a specific example
- describe basic eukaryotic cell structure
- describe the basic structure of a biological membrane and the mechanisms by which molecules move across biological membranes using specific examples
- utilize the laws of thermodynamics to explain energy relations in biological systems
- describe the main features and context of cellular aerobic respiration including the main events and cellular locations
- describe the main features and context of photosynthesis
- define and describe the relationship between genes, RNA, and proteins
- integrate an understanding of evolution into all topics addressed in this course

**Student Evaluation:** Final Grades will be based on a 500-point system consisting of the following:

2 In-class Hour Exams (75 pt. each)	150 pt.
Final Exam	100 pt.
*Formal laboratory report ( <del>respiration &amp; photosynthesis</del> )	50 pts
Laboratory Homework**	150 pt.
Quizzes (online and given in class see Class Schedule)	<u>150 pt.</u>
	600 pt.

\* protein lab used for formal lab report instead.

\*\*note that laboratory homework will be assigned regularly. The number of points each homework receives will depend on the complexity of the homework and will be announced as we proceed through the course.

### Letter Grade Earned by Percent Grade

92 – 100% = A,	89 – 91% = AB,	82 – 88% = B
79 – 81% = BC,	72 – 78% = C,	69 – 71% = CD

59 – 68% = D

**Course Website:** See your text for instructions for registering for our course website (created using the publisher resources for your textbook). The course ID is: **MBLAUNEN49173**

There should be an access code in your textbook which will be required for registering. You will also require an access code, included in your textbook. If you have purchased a used textbook you can buy access to the “Mastering Biology” website associated with the course, including our specific course website component, at [www.masteringbio.com](http://www.masteringbio.com) for approximately \$30 - \$40 dollars.

**Expectations and Responsibilities:** This is a college/university-level course. I expect you to engage in the material and take responsibility for your education. I expect that you will make every effort to promote a positive learning environment by treating your fellow students, yourself, and Keene State faculty and staff with respect at all times.

**Extra Credit Policy:** Extra credit is not a component of this course. If you are having difficulty with the course you should focus on accomplishing the assigned work correctly, rather than undertaking extra work. There are many opportunities in the course for students to earn grades in this course through engaging with the material provided. Please take advantage of the opportunity provided to all students taking the course and do not ask for special consideration which puts other students at a disadvantage.

**Exams:** The exam format will be a combination of short answers, matching, diagram labeling, fill-in the blanks and multiple choice. Exams will be based on lecture material and assigned readings, including online quizzes and on-line web tutorials associated with your textbook. The final examination will cover both new material and comprehensive material with the emphasis placed on new material. Makeup exams will only be provided to students if they have missed an exam for an acceptable reason (ie. illness) and have appropriate documentation (ie. a note from your physician or health services saying you were seen on the day of the illness).

**On-Line Quizzes and Web Tutorials:** Students will be responsible for completing weekly quizzes, the majority of which will be taken online through the “Mastering Biology” course associated website (see above). On-line quizzes can be taken up to 5 times in order to improve your score. You will have access to the on-line quizzes for several days each week. The deadline for completing the on-line quizzes will be midnight of the Saturday night following completion of the material in class. I will make announcements about the timing of quizzes in class. In some cases on-line tutorials will be assigned as a component of the on-line quiz.

**Labs:** This course is an integrated lab and lecture course. Lab activities will take place in the same room as lectures. Labs are generally indicated in the Class Schedule but this is subject to change. Directions for more comprehensive lab activities will be posted to Blackboard in advance of the date it is scheduled for – PLEASE READ THE ACTIVITY BEFORE CLASS. All labs will have assigned homework, due at a specific time, announced in class. There will be no makeup labs as setting up labs is complex and expensive. In the event that you miss a lab for a documentable excuse you must contact your professor immediately. You will still be responsible for completing the lab homework in the time frame required of all of your class mates. You will only be allowed to complete the homework if you provide documentation regarding your absence from an acceptable source (as above). The content of lab homework may be on your exams.

**Study Guide Policy:** Study guides will be provided at your professor’s discretion. In other words, there may not be a study guide for each exam. Preparing study guides is a study skill that all College-level students should develop. Study guides should always include all quiz and other questions assigned in the course, and should also include questions on material that was highlighted in a lecture, lab or other activity. You are encouraged to seek the assistance of your professor as you work to develop appropriate study guides for yourself.

**Students With Disabilities:** The Office of Disability Services (ODS) is where Keene State College students with documented disabilities can arrange those accommodations and academic services provided under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, which enable equal access to academic and campus programs and activities. The office is located in the Elliot Center on the

first floor of Elliot Hall and is open Monday through Friday from 8 a.m. to 4:30 p.m. For more information contact Jane Warner at [jwarner@keene.edu](mailto:jwarner@keene.edu) or 603-358-2354. Your professor CAN NOT LEGALLY provide you with accommodations for a disability unless you FIRST disclose that disability to ODS and follow the guidelines issued to you there.

**Inclement Weather Statement:** The KSC inclement weather policy will be generally adhered to (see <http://www.keene.edu/policy/inclementweather.cfm>) If in doubt, check for cancellations on the KSC website, the course Blackboard site, or by listening to one of the following television or radio stations: WMUR-TV (channel 9) in Manchester; the local radio stations WKNE (103.7 FM), WKBK (1290 AM), WZBK (1220 AM), WOQL (97.7 FM), WINQ (98.7 FM); WTSA (96.7 FM) and WKVT (1490 AM) in Brattleboro, Vt.; WEVO (89.1 or 90.7 FM) in Concord and WYRY (104.9 FM) in Winchester. **Students should check on Blackboard for class notifications regarding any cancelled classes as homework will generally be issued to compensate for the missed class time.** Off-campus students should use their own judgment regarding travel conditions and call or email if they are missing class and class is not officially cancelled.

**Provisions:** The administration of BIO 110 will adhere strictly to the regulations outlined in the Keene State College 2006-2007 Undergraduate and Graduate Catalog.

**BIO 110 Molecules and Cells Class Schedule Fall 2008**

Week	Date	Lecture Topic	Chp*	Lab Activity**
1	T Aug 26	Introduction to cells and macromolecules	1, 7	Introduction to cells through microscopy
	R Aug 28	Cell structure and diversity with emphasis on eukaryotic cells	7	“
2	T Sept 2	Cell structure and diversity with emphasis on eukaryotic cells	7	“
	R Sept 4	The chemical basis of life; water and carbon	2	Working with molecular models
3	T Sept 9	The chemical basis of life: chemical evolution	2	
	R Sept 11	Proteins and enzyme function	3	Enzyme lab
4	T Sept 16	Proteins and enzyme function	3	“
	R Sept 18	Proteins and enzyme function	3	“
5	T Sept 23	How sweet it is...carbohydrates	5	Staining carbohydrates in cells
	R Sept 25	Carbohydrates	5	
6	T Sept 30	<b>EXAM 1</b>		
	R Oct 2	Lipids and Membranes	6	
7	T Oct 7	Membranes and Membrane Transport	6	Membrane lab (RBCs, potato cores)
	R Oct 9	Diffusion and Osmosis	6	
8	T Oct 14	Aerobic cellular respiration	9	Mitochondrial isolation and staining
	R Oct 16	Aerobic cellular respiration	9	
9	T Oct	Aerobic Respiration	9	



	21			
	R Oct 23	Photosynthesis	10	Respiration and photosynthesis
10	T Oct 28	Photosynthesis	10	
	R Oct 30	<b>EXAM 2</b>		
11	T Nov 4	Nucleic acids	4	PCR
	R Nov 6	DNA synthesis	14	“
12	T Nov 11	<i>No class (Remembrance Day)</i>		
	R Nov 13	How genes work	15	
13	T Nov 18	Transcription and translation	16	
	R Nov 20	Gene expression	17, 18	Gene expression (pGLO lab)
14	T Nov 25	Gene expression	17, 18	“
	R Nov 27	<i>No class (Thanksgiving)</i>		
15	T Dec 2	Genomics and proteomics	20	Genomics activity (bioinformatics)
	R Dec 4	Genomics and proteomics	20	
		End of Regular Semester		
	M Dec 8	Reading Day		
	TBA	<b>Final Exam</b>		

\*Chp refers to the Chapter to read in “Biological Science”, see above.

\*\* The timing of lab activities is somewhat tentative and will be discussed/clarified on a weekly basis in class.

**Professor:** Dr. Loren Launen  
**Phone, E-mail:** 358-2574, llaunen@keene.edu  
**Office, Office Hours:** 330 SCIC, TR 9-10:00, W 4 - 5 or by appointment  
**Lectures:** MW, 2:00 – 3:45, SCIC 308  
**Text:** Introduction to Genetic Analysis, 9<sup>th</sup> Ed., Griffiths, Wessler, Lewontin & Carroll, 2008, ISBN-13: 978-0-7167-6887-6  
 (or ISBN-10: 0-7167-6887-9)

**Course Description:** An integrated lecture/lab treatment of transmission, chromosomal, and population genetics; gene mapping, genic interactions and mutations; and historical and social aspects of genetics. Assignments emphasize quantitative analysis and the use of experimental and statistical hypothesis. Lab activities promote familiarity with model organisms and the execution and presentation of genetic experiments. Prereq: MATH 141, BIO 110 and BIO 111.

### Blackboard and Textbook Website:

**Blackboard:** Please visit <http://keene.blackboard.com/index.html> (or access via MyKSC) within the first day of class to verify that you are listed on the course Blackboard. Note that the email for you listed in Blackboard is your KSC email. You are responsible for keeping your KSC email account working throughout the semester so that I can reach you at that address. Several useful links and other information necessary for the course will be posted to Blackboard. Key announcements regarding class cancellation (if necessary) will also be posted to Blackboard.

**Textbook Website:** Please see pages xx and xxi of your text for textbook website address. Note that there may be an “e-book” also accessible, see the introductory pages of your textbook and accompanying information in your text (if any) for more information.

### Learning Objectives:

This sophomore-level course is required of all students majoring in BIOLOGY. By the end of this course, you should be able to

- ✓ express and apply the main principles of transmission genetics, gene mapping, cytogenetics, molecular genetics, mutation and cancer genetics;
- ✓ demonstrate *critical thinking and statistical skills* developed through Problem Sets involving quantitative data analysis and the application of genetic logic;
- ✓ interpret news articles from a scientifically informed perspective and identify professional genetic resources;
- ✓ demonstrate a *practical mastery of concepts* that will enhance your understanding of other biological disciplines. Genetics forms the basis of virtually every aspect and subdiscipline of modern life science as well as of related professions and technical occupations such as medicine or biotechnology.
- ✓ describe the historical roots of genetics and the social impact of genetics.

**Methodology:** Class meetings are devoted to lecture and discussion of assigned readings and problem sets as well as various hands-on and laboratory projects. You may have to work in the laboratory at hours outside the official class meeting times.

**Student Evaluation:** Final grades will be determined as follows:

Class Point Distribution		Letter Grade Earned by Percent Grade
2 In-class Exams (100 pt. each)	200 pt.	Class points earned will be divided by 680 (total points possible) and multiplied by 100. Letter grades will then be assigned as follows: 92 – 100% = A 89 – 91% = AB 82 – 88% = B 79 – 81% = BC 72 – 78% = C 69 – 71% = CD 59 – 68% = D
Final Exam	140 pt.	
Quizzes (4)	100 pt.	
Problem Sets	100 pt.	
Citizenship	25 pt.	
Genetics in the News Assignment	15 pt.	
<i>Drosophila</i> Predictions Assignment	10 pt.	
<i>Drosophila</i> Final Written Report	60 pt.	
<i>Drosophila</i> Presentation	30 pt.	
<b>Total</b>	<b>680 pt.</b>	

**Exams:** The exam format will include many problems based on the problem sets. Exam material will include the required reading and all lecture content. Exams may include some reference to laboratory content where applicable. Study guides will be provided only at the discretion of the professor and may consist of oral discussion of the exams during class time. The final examination will be cumulative. Note that I will adjust your lower mid-term score to a value out of 80 points and your higher mid-term score to a value out of 120 points before calculating your final class grade.

**Quizzes:** Short quizzes (20 minutes) specifically focusing on the problem sets, reading and lecture material will be given. There will be four quizzes given, as indicated by a “Q” on the course schedule. Each quiz will be worth 25 class points.

**Make-Ups:** Make up exams and quizzes will only be allowed for students who have provided appropriate documentation from a professional authority (e.g. a physician) within **ONE** day of the missed exam/quiz or as soon as is reasonably possible. The Make-up exam/quiz **MUST** be taken within 3 class days of the original. There will be no make-up labs. Appropriate reasons for missing exams or quizzes include serious illness, psychological problems, family crisis, military obligation or official athletic event. If it is an athletic event you should notify me of this at the beginning of the semester since you will have your schedule for these events very early in the semester. Note that vacation plans, family travel or job conflicts do NOT qualify you for a make-up. Please see me regarding field trips for other courses.

**Special Note Regarding Spring Break:** Spring Break begins Saturday, March 15<sup>th</sup> and extends until Sunday March 23<sup>rd</sup>. Missing class for Spring Break is totally unacceptable and will result in loss of citizenship points. You should notify your family that you are NOT available to travel during regular scheduled class time before or after Spring Break.

**Problem Sets:** Problem sets are an essential component of this course. Some will be based on in-class activities, others will be homework assignments provided in the textbook or handouts (typically posted to Blackboard). I expect your hand-ins to show that you have worked hard,

seriously and professionally. Take pride in your work products! The following are minimal expectations that I hold with regard to all hand-ins.

- Complete your answers on standard sized paper using ink or very legible pencil. If your writing is not legible then type your assignments. Do not use red ink as I will use this for grading.
- Provide your answers IN SEQUENCE. Answers that are not in sequence demonstrate a lack of professionalism and care.
- Include complete answers that demonstrate the “logic” used in solving the problem. A correct answer resulting from an illogical process is both worthless and also requires that I investigate the answer as a potential case for academic dishonesty. Sometimes there is more than one method for answering a question, however all answers must be clear and complete.
- Make a copy of all of your answers before handing them in. Some of your hand-ins may not be returned if they are being saved as examples of good student work.
- Late problem sets will NOT be accepted. Problem sets will be requested at some point in the class. Please do not leave completion of problem sets to the last minute. Working on problems sets while I am lecturing on another topic or we are conducting another activity is not acceptable.
- Staple the pages of your problem set answers together. Unstapled problem sets will be considered late. If you need to BUY A STAPLER NOW.

**Evaluation of Problem Sets:** All problem sets will be collected and evaluated for format and completeness, not for correctness. Selected problem sets (announced in class on a case-by-case basis) will be graded for correctness. In all cases correct answers will be provided to you during class time, or posted to Blackboard. You are responsible for verifying the correctness of all of your problem sets!! This material will be on your quizzes and exams.

**Discussion of Problem Sets:** Be prepared to discuss your solutions. We will spend class time discussing most problems.

**Citizenship:** Citizenship will be determined based on your level of participation (which requires attendance) and effort demonstrated over the course of the semester. Demonstrating that you have done the reading ahead of class time, and that you have worked hard on the problem sets provided will assist your citizenship score. Late arrivals, early departures, disruptive behavior and participation patterns will be recorded. Although absences may be recorded you will not receive a score for attendance *per se*. Former genetics students can attest that regular attendance is essential for mastery of the material. The quality and value of the collective learning process is influenced as much by your preparation and motivation as by the instructor's planning and presentation. My assessment of the quality of your engagement in class discussion or activities will influence your final course score. Points will be deducted for disruptive or irresponsible behavior (see the attached Policy regarding classroom deportment) or excessive absences.

- Do not expect that you will be able to make up missed lab activities.
- You must help maintain a safe, clean, and orderly laboratory environment.
- **You may not bring food or drink into room 308.**
- Athletes should notify me of possible schedule conflicts at the beginning of the semester.
- If you miss three-weeks worth of class meetings (6 sessions) you **MUST** withdraw from the course before the withdrawal deadline.

**Genetics in the News Assignment:** You will make brief oral presentation to the class about a news article on a genetics topic. Details of the assignment will be provided in class.

**Lab:** Lab activities will consist of an exercise using Maize (corn), *Sordaria* (a filamentous fungus) and a statistical exercise during the pre-break portion of the course. A multi-week project, beginning just before Spring Break, utilizing *Drosophila* (fruit flies) will comprise a significant portion of the lab activities for this course. This project will require you to spend time outside of regular scheduled class time. There are no make-up lab times. You are expected to fully participate in lab activities (and all class activities), to arrive on time, and to leave work areas and equipment clean and cared for.

**Extra Credit Policy:** There will be no extra credit opportunities in this course. If you are having difficulty with the course you should focus on accomplishing the assigned work correctly, rather than undertaking extra work.

**Students With Disabilities:** The Office of Disability Services (ODS) is where Keene State College students with documented disabilities can arrange those accommodations and academic services provided under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, which enable equal access to academic and campus programs and activities. The office is located in the Elliot Center on the first floor of Elliot Hall and is open Monday through Friday from 8 a.m. to 4:30 p.m. For more information contact Jane Warner at [jwarner@keene.edu](mailto:jwarner@keene.edu) or 603-358-2354. Your professor CAN NOT LEGALLY provide you with accommodations for a disability unless you FIRST disclose that disability to ODS and follow the guidelines issued to you there.

**Inclement Weather Statement:** The KSC inclement weather policy will be generally adhered to (see <http://www.keene.edu/policy/inclementweather.cfm>) However, in the event that the course professor cannot safely travel to the college, check the KSC website or listen to one of the following television or radio stations to see if the College is under curtailed operations (in other words, classes are cancelled): WMUR-TV (channel 9) in Manchester; the local radio stations WKNE (103.7 FM), WKBK (1290 AM), WZBK (1220 AM), WOQL (97.7 FM), WINQ (98.7 FM); WTSA (96.7 FM) and WKVT (1490 AM) in Brattleboro, Vt.; WEVO (89.1 or 90.7 FM) in Concord and WYRY (104.9 FM) in Winchester. **Students should check on Blackboard for class notifications regarding any cancelled classes as homework will generally be issued to compensate for the missed class time.** Off-campus students should use their own judgment regarding travel conditions and call or email if they are missing class and class is not officially cancelled.

**Provisions:** The administration of BIO 211 will adhere strictly to the regulations outlined in the Keene State College 2007-2008 Undergraduate and Graduate Catalog.

**Biology Departmental Policy for Classroom Department**  
(adopted: May 12, 2001; revised: August 24, 2005)

*The Biology Department has agreed to the following statement and policy regarding standards for the classroom environment:*

Teaching methods will vary from course to course, sometimes requiring tight organization, in other instances encouraging informal interaction. In any case, the classroom environment must encourage and support learning. Such an environment requires respectful attention and mature, courteous participation on the part of everyone in the class - instructor and students alike. Participants must respect each other and the learning process and should give undivided attention to the subject matter and to classroom activities. The Biology department favors active learning by engaged students whose actions in the classroom promote - rather than hinder - learning by all students.

In order to foster constructive interactions in the classroom, instructors may officially discourage or ban some activities. The following are examples of behaviors that the Biology Department regards as inappropriate for a college classroom and considers **unacceptable** because they undermine respect for learning and subvert the collective learning process:

1. Arriving at class late and leaving early
2. Leaving the class during the class period (e.g. for restroom breaks, snacks, or telephone conversations)
3. Irrelevant or distracting communications (private conversations, passing notes, non-verbal gesturing)
4. Disruptive behavior
5. Sleeping during class
6. Eating in the classroom and laboratories
7. Reading material not relevant to the class
8. Putting your feet on desks, tables, lab benches, or chair seats
9. Attending sections for which you are not scheduled without prior consultation with instructor.
10. Defacing college property (writing graffiti, etc.)
11. Speaking disrespectfully to other students or to the instructor.
12. ***Using cell phones (in any way) or letting cell phones ring during class.***

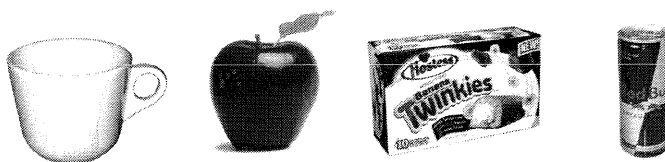


consultation

Note that leaving your phone on "vibrate" if you are required to for family or other reasons is acceptable.

Although you may have different experiences in other programs, it is Biology Department policy to address your professors with respect and understanding of their professional position.

**Special notice regarding room 308: Because this is a laboratory, state and federal safety guidelines do not permit food and drink in the room. Leave all food and drink outside the room.**



**Verboten!!**

**BIO 211-03 Genetics, Class Schedule Spring 2008**

Class	Date	Day	Subject	Chapter/ Section	Lab or Other Activities
1	23-Jan	W	Introduction to Genetics	1	
2	28-Jan	M	Patterns of Single Gene Inheritance	2 (2.1 – 2.4, 2.6)	Maize analysis
3(Q)	30-Jan	W	Single-gene inheritance; probability	2 (2.1 – 2.4, 2.6) 3.3	
4	4-Feb	M	Independent assortment (Chi-Square tests)	3.1, 3.2. 3.4	Genetics in the News Assignment
5	6-Feb	W	Independent assortment (Chi-Square tests)	3.1, 3.2. 3.4	
6	11-Feb	M	Independent assortment (Chi-Square tests)	3.1, 3.2. 3.4	Coin Toss Activity
7(Q)	13-Feb	W	Chromosomes; life cycles; mitosis/meiosis, organelle genes	2.3; 3.3; 3.5	
8	18-Feb	M	Sex-related inheritance	2.5	
9	20-Feb	W	<b>Exam 1</b>		
10	25-Feb	M	Chromosome mapping; Recombination and Linkage analysis	4	Introduction to <i>Drosophila</i> , Predictions assignment
11	27-Feb	W	Chromosome mapping; Recombination and Linkage analysis	4	
12	3-Mar	M	From genotype to phenotype	6	Learn <i>Drosophila</i> techniques
13(Q)	5-Mar	W	Genic interactions	6	
14	10-Mar	M	DNA	7	Setup <i>Drosophila</i> crosses (to obtain F2)
15	12-Mar	W	RNA: transcription and processing	8	
Spring Break 17-Mar – 21-Mar					
16	24-Mar	M	Proteins	9	Collect observations on <i>Drosophila</i> crosses & provided testcross
17	26-Mar	W	Proteins	9	
18	31-Mar	M	Mutation and Repair	15	Drosophila data analysis, report writing
19	2-Apr	W	<b>Exam II</b>		
20	7-Apr	M	Mutation and Repair	15	Drosophila data analysis, report writing
21	9-Apr	W	Regulation of Gene Expression: Bacteria	10	
22	14-Apr	M	Regulation of Gene Expression: Eukaryotes	11	
23 (Q)	16-Apr	W	Cytogenetics	16	
24	21-Apr	M	Cytogenetics	16	<i>Drosophila</i> presentations
25	23-Apr	W	Cancer genetics	15.6	
26	28-Apr	M	Cancer genetics	15.6	
27	30-Apr	W	Overflow/Review		
	5-May	M	Reading Day		
Please see College website			Final Exam		

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**Instructor:** Dr. Karen Cangialosi, **SCIC 326**

**Phone:** 358-2578

**Office Hours:** Tues, Thur, 4:00-5:00pm

**Text:** Animal Behavior, 9<sup>th</sup> edition, by John Alcock; Sinauer Associates, 2009.

**Severe Weather Policy:** In the event of severe weather, please call my voice mail box (8-2578) for a message. I will try to post a message within an hour before class starts. Generally speaking, if Keene Public Schools are not cancelled (SAU 29), there will be NO chance that I will cancel class. If Keene Public Schools are cancelled, I will CONSIDER canceling class but this is NOT a given.

**Course Description:**

This course will examine the complex ways that genes, physiology, development and the environment interact to determine animal behavior, how behavior contributes to the survival and reproduction of animals, and how behavior has changed over evolutionary time. Neural and hormonal mechanisms of behavior, behavioral development, and the evolution of foraging, habitat selection, mating systems, parental care, and social behavior will be explored.

**Learning Outcomes:**

Knowledge

Students will be expected to:

- understand and explain proximate and ultimate causes of behavior
- understand and explain some of the complex ways in which genes, physiology, development and the environment interact to determine the behavior of animals
- understand and explain how behavior contributes to the survival and reproduction of animals
- understand and explain how and why behavior has changed over evolutionary time
- understand and explain some neural and hormonal mechanisms of behavior
- understand and explain the interactive nature of behavioral development with genes and the environment
- understand and explain the fallacies in the "nature/nurture" controversy
- understand and explain some aspects of the evolution of foraging, habitat selection, mating systems, parental care, and social behavior in animals

Skills

Students will be expected to:

- increase their verbal communication skills and demonstrate their ability to verbalize complex ideas by engaging in class discussions and presenting project results orally
- demonstrate the ability to lead class discussion on a particular piece of current research in animal behavior
- demonstrate the ability to summarize readings on their own and develop questions for discussion



- increase their writing communication skills and demonstrate their ability to articulate complex ideas through the writing of comprehensive essays, a research proposal, and a scientific research paper
- demonstrate their understanding of the process of scientific research by completing an independent research project
- demonstrate their ability to engage in all steps of scientific study including making observations, searching the primary literature, formulating hypotheses, collecting data, statistically analyzing data, interpreting results, presenting results orally, and writing a scientific paper
- demonstrate their ability to use the computer for data summary and statistical analysis, and data/results presentation

## Evaluation:

### 1. Exams

There will be a total of three: two in class exams and a final exam. These exams will consist entirely of essay questions from material presented in class, class discussions and readings.

**MAKE-UPS OF EXAMS WILL BE ADMINISTERED ONLY TO STUDENTS WHO HAVE REQUESTED THEM WITHIN ONE WEEK OF THE DESIGNATED EXAM DATE. REQUESTS FOR MAKE-UPS MUST BE IN WRITING AND MUST EXPLAIN EXACTLY WHY IT WAS IMPOSSIBLE FOR THE STUDENT TO ATTEND DURING THE SPECIFIED TIME PERIOD. MAKE-UP EXAMS ARE LIKELY TO BE PARTLY ORAL.**

### 2. Journal Article Discussions

There will be two relevant journal articles from the current research literature in animal behavior assigned during the semester that the entire class will read. The class will be divided into groups designated by the instructor. Each group will be responsible for presenting some portion of the information in the article and leading the class in detailed discussion and critical analysis of the scientific study. Your grade will be based on several factors:

1. your presentation of the material in the paper, including gathering background material and use of visual aides
2. your effectiveness at facilitating discussion, including raising pertinent questions
3. your participation in the discussions for which you are NOT a facilitator
4. exam questions directly related to the journal article

More information about journal article discussions will be presented in class.

### 3. Participation and Attendance

Active participation in this class is *critical*. This means more than sitting silently and taking notes. Students are expected to come to class prepared, pay attention during class, ask questions, and to be involved in discussions related to the readings and lectures. All students will be called on repeatedly throughout the semester and your ability to participate effectively will be an important factor in your grade.

A poor attendance record will affect your grade in this class in the following way. Every student will be allowed to miss 1 class "free" regardless of the excuse, with no impact on their final grade. After that, **20 pts will be deducted** for each class absence. There are no "excused vs. unexcused" absences. You will not be required to provide an excuse for any absences at all. This means that ALL excuses, legitimate or otherwise, will count towards your free cut. It is therefore advised that you "save" your "free cut" for a time when you can't get to class for a legitimate reason such as illness or a family situation.

If you are **late**, you will likely be recorded as **absent**. Please note that it is **NOT** the instructor's responsibility to make missed material available to absentees.

#### **4. Research in Animal Behavior**

This course will involve exercises designed to instruct students in the process of research in animal behavior including literature searching, hypothesis formation, experimental design, data collection, statistical analysis, data presentation and interpretation, computer skills, scientific writing, and oral presentation. Using the skills obtained, each student will complete a self-designed research project. Be aware that there is a heavy emphasis on statistical data analysis and WRITING in this course!

#### **Point Break-Down and Grading Scale:**

Exam 1	75 pts	460-500	A
Exam 2	75 pts	445-459	AB
Final Exam	75 pts	410-444	B
Journal article discussions	50 pts	395-409	BC
Class participation	25 pts	360-394	C
Proposal 1 <sup>st</sup> draft	25 pts	345-359	CD
Proposal 2 <sup>nd</sup> draft	25 pts	295-344	D
Isopod write-up	25 pts	≤ 294	F
Research project paper 1 <sup>st</sup> draft	25 pts		
Research project paper final draft	75 pts		
Oral presentation	25 pts		
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Total possible points	500 pts		

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#### **SCHEDULE OF TOPICS (Subject to Change)**

DATE	TOPIC	READINGS (Chap.)
Sep 1 & 3	Introduction to Animal Behavior, Proximate and Ultimate Explanations, Evolution <i>Observations, questions, hypotheses</i> <b>Due Sep 3: Observations</b>	1, 2
Sep 8 & 10	Proximate and Ultimate causes of Bird Song <i>Collecting behavioral data</i>	2
Sep 15 & 17	The Development of Behavior and the Nature/Nurture fallacy <i>Proposal writing, statistics</i> <b>Due: Initial Bibliography, research questions, project title</b>	3

Sep 22 & 24	The Control and Organization of Behavior: Nervous system, Hormones <i>Experimental design and hypothesis testing</i>	4, 5
Sep 29	<b>*** EXAM 1 ***</b>	
Oct 1	Nervous system, Hormones <i>Data analysis and presentation</i> <b>Due Oct 1: Proposal 1<sup>st</sup> draft</b>	4, 5
Oct 6 & 8	Behavioral adaptations for Survival <i>Project meetings</i> <b>Due Oct 8: Isopod write-up</b>	6
Oct 13 & 15	<b>1st Journal Article Discussion</b> <i>Project meetings</i>	
Oct 20 & 22	Behavioral adaptations for Survival <i>Project meetings</i> <b>Due Oct 22: Proposal final draft</b>	6
Oct 27 & 29	Foraging Behavior <i>Research paper writing</i>	7
Nov 3	Foraging Behavior <i>Project data analysis</i>	7
Nov 5	<b>*** EXAM 2 ***</b>	
Nov 10 & 12	The Evolution of Reproductive Behavior <i>Project data analysis</i> <b>Due: 1<sup>st</sup> draft research project paper</b>	10
Nov 17 & 19	<b>2nd Journal Article Discussion</b> <i>Paper writing feedback</i>	
Nov 24	The Evolution of Reproductive Behavior	10
<b>Nov 26</b>	<b>Thanksgiving holiday – No class</b>	
Dec 1 & 3	Mating Systems, Evolution of Social Behavior <i>Final paper writing and presentation preparation</i>	11, 13
Dec 8	The Evolution of Human Behavior	14
Dec 10	<i>Oral Presentations of Project Results</i> <b>Due: Final research project paper</b>	
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<b>Dec 17</b>	<b>Thurs 1:00pm-3:00pm FINAL EXAM</b>	

**Syllabus****IQL 101-19 Counting on Conservation****Fall 2007**

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**Instructor: Dr. Karen Cangialosi**, Professor of Biology

**Office:** SCIC 326

**\*Office Hours:** Tues, Weds, Thurs 2:00-3:00pm

**Telephone:** 8-2578

**Email Address:** kcangial@keene.edu

**Class meeting time:** Weds 10:00 – 1:30pm

\*If you need to talk with me and can't attend my office hours, please send me an email message to set up an appointment.

**Course Description:**

This lab/lecture integrated course will focus on examining patterns of biodiversity through field sampling and quantitative analyses. Students will apply these analyses to investigate the evolutionary origin of species, species conservation efforts, the global biodiversity crisis and the animal rights controversy. This course also introduces students to quantitative reasoning skills and habits of mind to understand and apply quantitative information to their lives. Students will investigate questions or problems and analyze data using descriptive statistics.

**Note About Fieldwork:**

We will spend considerable time outdoors in grass fields, local parks and woods, and around campus during this class. Dress appropriately and choose sensible footwear. If you have allergies to pollen, poison ivy, bees or other plants/animals found outdoors, please let me know. We will go on field trips rain or shine (unless the weather is very severe). Make sure you bring a rainjacket. If you hate being outside, you should consider taking another class.

**COURSE OUTCOMES / OBJECTIVES (4 categories):****Quantitative Literacy Outcomes**

*Students will be able to:*

- Apply the basic methods of descriptive statistics, including both pictorial representations and numerical summary measures, to analyze data.
- Use appropriate software to create spreadsheets, tables, graphs and charts.
- Read and interpret visually represented data.
- Distinguish among various types of growth models (e.g., linear, exponential) and the types of situations for which the models are appropriate.
- Critically read and interpret a quantitative problem.
- Pose a question in the form of a mathematical model in order to solve the problem.
- Apply prior knowledge to solve a new problem.

### **Disciplinary / Interdisciplinary Outcomes**

*Students will be able to:*

- Understand how conservation biologists use the results of quantitative studies to make planning decisions for threatened or endangered species
- Explain the process of natural selection in causing evolutionary change
- Understand other mechanisms of evolutionary change
- Explain the basic processes of speciation and extinction
- Understand how evolutionary processes have led to current patterns of biodiversity
- Understand how biologists use population growth models to make predictions about future population sizes of invading species
- Compare current vs. historical rates of species extinction

### **Integrative Outcomes:**

*Students will be able to:*

- Identify the ethical issues raised by the following questions: Do all species have an inherent right to exist? Are humans more important than other species?
- demonstrate a commitment to analyzing the global biodiversity crisis
- articulate the human/nature conflicts involved in species conservation efforts

### **Skills Outcomes:**

*Students will demonstrate proficiency in:*

- Oral and Written Communication
- Critical Thinking through group discussions and written reports
- Quantitative Reasoning skills (see above)
- Spreadsheet use (EXCEL) to summarize, analyze and present data

## **ATTENDANCE AND PARTICIPATION**

***Attendance and participation are critical in this class.*** Remember that since we only meet once a week, missing class means missing a week's worth of classes. You are expected to attend all classes. Attendance includes coming to class on time and not leaving until dismissed. Participation means that you are attentive and actively engaged in all class discussions, and lab and field activities. **You must provide acceptable documentation for any missed class, this includes signed notes from physicians, or suitable documentation of a family emergency.** It is NOT the instructor's responsibility to make missed material available to students.

**You will lose 5-10 points for every class that you attend late or leave early. You will lose 25 points for each unexcused absence.**

## GRADES

Your grade will be determined based on a point system according to the following:

1. Attendance and Participation	50
2. Arthropod diversity project write-up	100
3. Arthropod diversity oral presentation	25
4. Tree species composition project write-up	100
5. Tree species composition project oral presentation	25
6. Problem sets and other written assignments	150
7. Midterm Exam	50
8. Final Exam	100
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Total Points Possible	600

552-600	A
534-551	AB
492-533	B
474-491	BC
432-473	C
414-431	CD
354-413	D
<413	F

**Please note that your work may be randomly selected for review for the purposes of assessing the effectiveness of the Integrative Studies Program. Your work will be reviewed only by faculty responsible for assessing the effectiveness of the Integrative Studies Program, and your confidentiality will be maintained.**

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**Schedule of Topics and Activities (Dates subject to change)**

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Aug 29	Introduction to ecology, biodiversity and quantitative reasoning <i>Arthropod Diversity Project</i> : Identifying study sites
Sep 5	Descriptive statistics <i>Arthropod Diversity Project</i> : Sampling and Field Data Collection
Sep 12	More concepts in ecology <i>Arthropod Diversity Project</i> : More data collection
Sep 19	Using Excel, creating and reading graphs <i>Arthropod Diversity Project</i> : Identifying specimens and data analysis
Sep 26	<i>Tree Diversity in Keene</i> : Field data collection Continue arthropod data analysis and presentation
Oct 3	<i>Tree Diversity in Keene</i> : More data collection, data analysis
Oct 10	<b>Student Presentations of Arthropod Data</b> <i>Tree Diversity in Keene</i> : Continue tree data analysis and presentation
Oct 17	<b>Midterm Exam</b> Models of population growth, Estimating population size Begin mark-recapture study
Oct 24	Natural selection and evolutionary change, Speciation Predator-prey evolution simulation, Continue mark-recapture study
Oct 31	Causes of extinction, human influences on biodiversity Human demography
Nov 7	<b>Student Presentations of Tree project data</b> Human demography data analysis
Nov 14	The conservation of endangered and threatened species Mark-recapture data analysis
Nov 21	<b>Thanksgiving Break – No Class</b>
Nov 28	The ethics of wildlife conservation
Dec 5	The global biodiversity crisis and related environmental issues

**SYLLABUS**  
**INTEGRATIVE PERSPECTIVES: PLANTS IN HUMAN AFFAIRS (INBIO 100)**  
**Fall 2008**

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**Instructor:** Dr. Kristen Porter-Utley  
**Office:** 331 Science Center  
**Office Hours:** M 2:00-3:00pm, W 3:00-4:00pm, F 11:30am-12:30pm  
**Telephone and E-mail:** 358-2576, kporterutley@keene.edu  
**Texts:** Required: Plotkin, M.J. 1993. *Tales of a Shaman's Apprentice*. Viking Press, New York.  
Required: Pollan, M. 2006. *The Omnivore's Dilemma: A Natural History of Four Meals*. Penguin Press, New York.  
On Reserve in Library: Levetin, E. and K. McMahon. 2008. *Plants and Society, 5<sup>th</sup> Edition*. McGraw-Hill, Boston.  
**Course Website:** Visit the course website accessed through MyKSC or at <http://keene.blackboard.com/>.

**Catalog Description:** "Plants in Human Affairs explores the interactions between human cultures and plants."

**Course Objectives:** This course is designed to introduce students to plant science, the diversity of ways in which plants are used in different societies throughout the world, and the ways in which plants and plant uses have shaped past and modern cultural development.

**Course Outcomes:**

**Course Requirements:**

1. Quizzes. You will receive approximately 4 quizzes.
  - a. Quizzes will be announced and given in the first 10 minutes of class. If you arrive to class five minutes late, you will have five minutes to take the quiz. **So, be on time!**
  - b. **You may not make up a missed quiz for any reason.**
2. Assignments. You will receive approximately 8 assignments.
  - a. Assignments are due before class via Blackboard and will focus on the readings from *Tales of a Shaman's Apprentice* and *The Omnivore's Dilemma*. Unless otherwise noted, assignments must be completed individually.
  - b. **I will not accept late work for any reason.**
  - c. **You may not make up a missed assignment for any reason.**
3. Project – What Am I Eating?
  - a. See project guidelines on separate handout.
  - b. Project must be completed individually.
  - c. **I will not accept late work for any reason.**
4. Lecture Exams. There will be two exams, each consisting of a combination of multiple choice, fill-in-the-blank, short and long answer questions. Each exam will cover material introduced after the previous exam.
5. Final Lecture Exam. Part of the final exam will be devoted to material presented after the second lecture exam and part of the final exam will cover themes from the earlier parts of the course. The format of the exam will follow that of the regular lecture exams.



6. Make-up Exams.
  - a. **A make-up test will be administered only if you miss a regularly scheduled exam due to military duty, a serious illness, a psychological problem, or a family emergency.** You must provide written documentation of a valid problem from a credible professional (e.g., physician) or parent in order to make-up an exam. You must inform me of your need to miss an exam **prior** to the exam itself; you may leave a voice message for me at 358-2576 any time **before** the start of the exam. If you receive permission to make-up an exam but are unable to take it within a week of the regular test date, your exam will be administered during the last week of the semester. The make-up exam may not cover the same material as the original exam and may be presented in a different format.
7. Academic Honesty. Please see the *Policy on Academic Honesty* section on page 58 of *The Keene State College Student Handbook* (<http://www.keene.edu/young/forms/studenthandbook.pdf>). Any incidents of academic dishonesty will be reported and dealt with as a serious breach of conduct.
8. Attendance and Participation.
  - a. You are expected to attend each class meeting.
  - b. It is not the instructor's responsibility to make materials available to those who miss class.
  - c. Your thoughtful contributions to this course are truly valued. However, up to 30 points may be deducted for disruptive or inappropriate conduct or for regular abstention from class discussion; more extreme remedies may be imposed if necessary. Please see the *Biology Department Policy for Classroom Department* (course website) for examples of unacceptable conduct. The *Policy for Classroom Department* does not address the issue of cellular telephones. Do not plan to use your cellular telephone in any manner during my class.
9. Weather Policy. Check Blackboard and my voice mail to learn if I will meet with class during inclement weather.

#### Evaluation:

2 Lecture Exams (@100 points each)	200 points
Final Exam	140 points
~12 Quizzes and Assignments(2,10 point scores will be dropped)	100 points
Project - What Am I Eating?	100 points
Classroom Department/Participation	30 points

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Total Possible Points ~570 points

\*\*\*If you have a documented disability and require adaptations or alternative testing, please notify me in writing or meet with me during my office hours. This way we can collaborate and ensure proper resources and supports are in place to assist you with your success.\*\*\*

## INTEGRATIVE STUDIES OUTCOMES

### Perspectives Outcomes:

**Knowledge in Natural Sciences:** Students will be able to distinguish and assess the impact that knowledge and methodology in the plant sciences have on our understanding of self, society, and the environment.

**Scientific Method:** Students will understand how the scientific method and other forms of inquiry are used in the plant sciences to increase our understanding of the natural world.

### Integrative Outcomes:

**Diversity:** Students will be able to: 1) recognize how differences shape approaches to identity, knowledge, and power, and 2) apply diverse perspectives and experiences to develop disciplinary arguments.

**Ethics:** Students will be able to identify ethical issues and propose possible solutions to ethical problems associated with the plant sciences.

**Social and Environmental Engagement:** Students will be able to: 1) recognize the importance of plants to humans and other organisms, 2) demonstrate a commitment to analyzing social and environmental issues, and 3) recognize the interrelationships between the natural world and social-cultural systems and the ways in which humans can both degrade and sustain the environment.

**Global Issues:** Students will be able to: 1) approach global issues from multiple perspectives in deriving solutions to potential conflicts, 2) critique a discipline through the lens of other cultural values, 3) demonstrate a commitment to analyzing and/or solving global issues, 4) demonstrate knowledge about cultures, societies, religious worldviews and /or political/economic systems outside of the western context, and 5) demonstrate an understanding of non-western cultures from the context of those cultures.

### Skills Outcomes:

**Critical Thinking:** Through the incorporation of a variety of readings and classroom discussions, students will be able to 1) demonstrate the ability and willingness to approach a particular idea, problem, task, or goal from multiple perspectives, 2) analyze and interpret arguments made by oneself and by others to formulate and defend a conjecture or thesis, 3) synthesize information, arguments, and perspectives in order to create new meaning, insight, and understanding, and 4) apply critical thinking to important ethical and societal issues and problems.

**Reading:** Through the incorporation of a variety of textbooks (popular novels and a traditional plant science textbook) students will be able to: 1) read with an awareness of purpose, 2) formulate questions that lead to a greater understanding of the material, 3) demonstrate the ability to summarize and identify key points, and 4) demonstrate an understanding and ability to relate discipline and interdisciplinary specific information to topics presented in the course.

## Syllabus

student name \_\_\_\_\_

### I. COURSE: The Genetics & Evolution of Sex: Fall, 2008

INBIO 300-1 MW 10:00 am – 11:45 pm Media Arts 158  
INBIO 300-2 MW 2:00 pm - 3:45 pm Media Arts 158

COURSE DESCRIPTION: INBIO 300 introduces the biology of sex, primarily in animals, addressing the evolutionary and genetic basis of sex determination, sexual dimorphism, interspecific variation in reproductive biology, and the divergence of male & female sexual strategies. The course introduces hypotheses of ultimate and proximate causation and evaluates the costs and benefits of sex. [Note: this description replaces the generic description found in the catalog]



### II. PROFESSOR:

Dr. Kenneth D. Bergman  
[kbergman@keene.edu](mailto:kbergman@keene.edu)  
(603) 358-2580

### Office Hours

Tues 1:00 pm  
Wed 4:00 pm  
Thur 1:00 pm

### III. TEXTS: [additional readings will be posted on the course website or placed on reserve]

*Evolution: The Triumph of An Idea*, Carl Zimmer, Harper Perennial (2006)  
*Sexual Selections*, Marlene Zuk, Univ. of California Press (2002)  
*A Natural History of Sex*, Adrian Forsyth, Firefly Books (2001)

### IV. COURSE WEBSITE: I will post announcements, articles, handouts, assignments, images, PowerPoint presentations, and other useful or essential information on this website. [See VIII-H.]

### V. OBJECTIVES/OUTCOMES: INBIO 300 introduces junior/senior nonscience students to key biological ideas regarding the origin and diversity of animal sexuality. Hypotheses are tested or illustrated with cases drawn from natural history. INBIO 300 does not focus on human sexuality (hence you must transcend anthropocentric habits and “common sense” to grasp some central scientific ideas but the course should create a rich context for thinking about human sexuality and reproduction. Our goal is to cultivate biological and scientific literacy by drawing upon memorable narratives from the scientific study of sex in diverse animal species. The KSC Integrative Studies outcomes addressed by this course are listed below: for more course-specific outcomes, see the last page of the syllabus (after the course schedule).

#### KSC Integrative Studies Outcomes.

- \* IS PERSPECTIVES outcome: “articulate an understanding of representative theories in the natural and social sciences”
- ! IS PERSPECTIVES outcome: “understand how the scientific method differs from other modes of inquiry and ways of knowing”
- & IS INTEGRATIVE outcome (Diversity): “describe the extent, causes, and consequences of sexual diversity among individuals and between different species”
- \$ IS SKILLS outcome (Critical Thinking):
  - Ask sophisticated questions when engaging an idea, problem, task, or goal
  - Analyze and interpret evidence, conjectures, and alternative strategies related to a given idea, problem, task, or goal
  - Analyze and interpret arguments made by oneself and by others to formulate and defend a conjecture or thesis
  - Synthesize information, arguments, and perspectives in order to create new meaning, insight, and understanding
  - Develop analytical arguments
  - Acknowledge and develop both insight and perspective”

*Please note that your work may be randomly selected for review for the purposes of assessing the effectiveness of the Integrative Studies Program. Your work will be reviewed only by faculty responsible for assessing the effectiveness of the Integrative Studies Program, and your confidentiality will be maintained.*

## VI. IMPORTANT QUESTIONS addressed by this course:

01. What is sex? Can sex occur without males and females?
02. What is unique about science? What do scientists do?
03. What are proximate and ultimate biological causes?
04. Who were Darwin and Mendel, and why are they important?
05. How do genetic principles account for diversity and similarity of individuals?
06. What is natural selection, and why is genetics relevant to the theory of natural selection?
07. How does evolution account for the diversity and similarity of species?
08. Why is sex important and nearly universal?
09. How and why do some species persist without sex?
10. How do male/female differences in vertebrates arise?
11. What are hermaphroditism and intersexuality?
12. What are the consequences of inbreeding and incest?
13. How and why do mating systems vary among animal species?
14. Are male and female sex roles uniform among animal species?
15. Why might male and female reproductive strategies differ?
16. Why do females and males of some species differ morphologically?
17. Why do people vary in sexual orientation?

**VII. METHODOLOGY:** Class meetings are devoted to lecture and discussion of readings and to varied in-class activities. I will present slideshows and audio and video clips. Student discussion is essential. I will take a 5 minute break approximately half-way through the period most days,

## VIII. COURSE REQUIREMENTS:

- A. **ASSIGNMENTS/QUIZZES** – I will give 5-10 in-class quizzes and short take-home assignments, some of which will involve preparing answers to study questions based on assigned readings. Assignments are due at the beginning of the period on their due-dates. If you miss class, send your work in with another student. Late or missing assignments are given a score of zero. Unless noted, assignments must be completed individually (not in collaboration). You may not make up a missed assignment or quiz, but I will drop your lowest score.
- B. **WRITING ASSIGNMENT** – You will submit a 5-6 page report based on your reading of one of our assigned texts and on a related scholarly paper which you discover. You will need my approval of this source: assignment details will follow.
- C. **HOURLY EXAMS** – There will be two hour exams consisting of questions requiring written answers (e.g., definitions, discussions, explanations, or problem-solving) and more objective questions (such as problems, diagrams, word-matching). All written answers must be intelligible, unambiguous, correctly spelled, and grammatically intact. I may (or may not) designate part of any exam as a take-home exercise. At the end of the semester, I will multiply your stronger exam score by 1.2 and your weaker exam score by 0.8. Therefore, do not expect a *precise* measure of your class standing until after Exam II.
- D. **FINAL EXAM** – Part of the final exam will be devoted to material presented after Exam II and part of the final exam will cover themes from the earlier parts of the course.
- E. **MAKE-UPS - important!**  
A make-up EXAM will be given if (and only if) you meet ALL 3 of the following conditions:

1. you miss a regularly scheduled exam due to a serious illness, psychological problem, military duty, or family emergency. *Work conflicts, vacations, or family travel do NOT entitle you to a make-up.* See me regarding KSC field trips or athletic competition;
2. you provide written documentation of such a valid problem from a credible professional authority (physician, dentist, therapist, social worker, coach) or parent; **AND**
3. you inform me of your need to miss the exam prior to the exam itself; leave a phone message at 358-2580 any time before the start of the exam.

If you're unable to take a make-up exam within a few days of the regular test date, your exam will be administered during the last week of the semester, may not cover the same material as the original exam, and may be in a different format.

- F. **EXTRA-CREDIT** - There will be no extra-credit assignments unless otherwise announced.
- G. **ACADEMIC INTEGRITY** - All work submitted under your name must be your own. Plagiarism and cheating are forbidden. Your instructor may suspend Fraternity/Sorority pledging requirements in the classroom to preserve a sound academic environment. Caps may not be worn during exams or quizzes (unless reversed). The KSC Policy on Academic Honesty requires the reporting of all infractions and establishes administrative records for all offenders. View the policy in your Student Handbook or on the Web at <http://www.keene.edu/policy/academichonesty.cfm>

- H. **CITIZENSHIP/PARTICIPATION/ATTENANCE** - You are expected to participate in class discussions and in-class activities, which may involve brief writings assignments, logical problem-solving, or reviews of previous class meetings (summaries of class notes), critiques of readings or videos, or other similar activities. If I evaluate these activities, I will use a simple semi-qualitative means of evaluation (raw scores of 0, 1 or 2 points).

Attendance will be recorded most days by checking assigned seats during the first 5 minutes of class. I will record late arrivals and early unauthorized departures. (Take care of personal needs before entering the classroom or wait until the mid-period break.) Attendance will not count directly toward your grade unless I detect frequent unexcused absences. Of course, frequent absences will interfere with your participation in the course.

Each student begins with 15 points in this category; up to 15 points may be added for consistently constructive participation, but points may also be deducted for disruptive or inappropriate conduct, for frequent unexcused absences, or for failure to participate or use the Blackboard website. More extreme remedies may be imposed. Read the **Statement of Student Rights and Responsibilities** and the **KSC policy on Sexist Language**, shown on pp. 7-8 of the KSC Student Handbook. Consult the "Biology Department Policy for Classroom Deportment" (below).

I strongly encourage thoughtful, spirited, and entertaining discussions, but in order to meet our course objectives and assure maximum engagement and learning by students from varied backgrounds, we must treat both the subject itself and all members of the class respectfully. Therefore, *sexual slang, sexual vulgarities, and sexually derogatory remarks are prohibited*. Choose your words carefully to assure that they foster scientific understanding and don't alienate your audience. I welcome thoughtful criticisms or suggestions regarding this course.

## IX. EVALUATION:

Written report .....	60 points
two mid-term [hour] exams (100 pts each)* .....	200 points
final exam .....	140 points
quizzes/small-scale assignments (lowest score dropped).....	100 points
participation/citizenship .....	<u>30 points</u>
TOTAL = 530 points	

\* Exam scores will be weighted at the end of the semester as described under VII-C above.

- X. **WEATHER POLICY:** If SAU 29 (Keene School District) cancels operations due to bad weather, I will not give an exam scheduled for that day, nor will I take attendance. To learn if I will meet with class that morning, call 358-2580 (on-campus: ext. 82580) and check my message. The exam will be given at the next regularly scheduled class meeting

- XI. **EMERGENCY POLICY:** If the KSC campus must be closed for an emergency and if that would result in the cancellation of more than one meeting of this class, I will post announcements on the course Blackboard site and open one of the discussion tools on that website so that we can maintain communication regarding the course during the emergency period.s

## Biology Departmental Policy for Classroom Department

(adopted: May 12, 2001; revised: August 24, 2005)

*The Biology Department has agreed to the following statement and policy regarding standards for the classroom environment:*

Teaching methods will vary from course to course, sometimes requiring tight organization, in other instances encouraging informal interaction. In any case, the classroom environment must encourage and support learning. Such an environment requires respectful attention and mature, courteous participation on the part of everyone in the class - instructor and students alike. Participants must respect each other and the learning process and should give undivided attention to the subject matter and to classroom activities. The Biology department favors active learning by engaged students whose actions in the classroom promote - rather than hinder - learning by all students.

In order to foster constructive interactions in the classroom, instructors may officially discourage or ban some activities. The following are examples of behaviors that the Biology Department regards as inappropriate for a college classroom and considers **unacceptable** because they undermine respect for learning and subvert the collective learning process:

1. Arriving at class late and leaving early
2. Leaving the class during the class period (e.g. for restroom breaks, snacks, or telephone conversations)
3. Irrelevant or distracting communications (private conversations, passing notes, non-verbal gesturing)
4. Disruptive behavior
5. Sleeping during class
6. Eating in the classroom and laboratories
7. Reading material not relevant to the class
8. Putting your feet on desks, tables, lab benches, or chair seats
9. Attending sections for which you are not scheduled without prior consultation with instructor.
10. Defacing college property (writing graffiti, etc.)
11. Speaking disrespectfully to other students or to the instructor.
12. ***Using cell phones (in any way) or letting cell phones ring during class.***



The use of iPods during class is also prohibited.

INBio 300: Tentative Course Schedule Fall 2008  
Partial reading list

	Date	Topic	Forsyth	Zimmer	Zuk
1	Aug. 25 Aug. 27	Intro; What is Sex? What is Science? Evolutionary changes; hypothesis exercise; Darwin		Preface, Intro, 1 & 2	
2	Sep. 01 Sep. 03	<b>Labor Day - no class</b> Charles Darwin and the Origin of Species			
3	Sep. 08 Sep. 10	Genetics and the origins of diversity Genetics and the origins of diversity		pp. 85 - 91	
4	Sep. 15 Sep. 17	Genetics and Natural Selection Genetics and Natural Selection		pp. 91 - 116	
5	Sep. 22 Sep. 24	Natural Selection Natural Selection		5 & 9	
6	Sep. 29 Oct. 01	EXAM I Why sex? Life without sex.	Preface, 16, 17	10	
7	Oct. 06 Oct. 08	Sex determination and sexual differentiation Sex determination and sexual differentiation	16, 17	pp. 274 - 280	
8	Oct. 13 Oct. 15	Hermaphroditism; intersexuality; sex change Hermaphroditism; intersexuality; sex change	13		
9	Oct. 20 Oct. 22	Inbreeding and incest Animal mating systems	14 & 15		4
10	Oct. 27 Oct. 29	Animal mating systems Animal mating systems	3, 5, 6	pp. 299 - 310	6
11	Nov. 03 Nov. 05	Does it matter who studies sexual biology? EXAM II			Intro. 1, 2, 3
12	Nov. 10 Nov. 12	Sexual dimorphism and sexual selection Sexual dimorphism and sexual selection	4		
13	Nov. 17 Nov. 19	Sexual dimorphism and sexual selection Sexual dimorphism and sexual selection	4 1		
14	Nov. 24 Nov. 26	Sexual conflict and manipulation <b>Thanksgiving - no class</b>	2, 8, 10		5
15	Dec. 01 Dec. 03	Sexual orientation Sexual orientation			11

Dec. 8	READING DAY			
Final	INBIO 300-1	Wednesday Dec. 10	10:30 – 12:30	
Exams	INBIO 300-2	Wednesday Dec. 10	3:30 – 5:30	

COURSE-SPECIFIC OUTCOMES: After completing this course you should be able to

- (a) define science & identify the qualities that distinguish scientific and nonscientific explanations;!
- (b) generate a scientific hypothesis and design a way to test it;!
- (c) critically evaluate the scientific validity of explanations of natural phenomena;<sup>\$</sup>
- (d) describe the significance and context of Mendel and Darwin's achievements;\* &
- (e) define sex and describe diverse modes of sexuality, beyond those familiar to humans; &
- (f) identify the costs and benefits of sex and hypotheses about the prevalence of sex;
- (g) describe the major forms of sex determination and differentiation and explain diverse paths of human sexual development; &
- (h) identify the sources of phenotypic diversity among individual organisms and apply Mendel's model of heredity to issues of animal and human inheritance;\* &
- (i) describe natural selection and sexual selection;\* &
- (j) distinguish proximate and ultimate causation;<sup>\$</sup>
- (k) describe diverse animal mating systems and hypotheses about their causes; &
- (l) identify the sources and consequences of conflict between male and female animals; &
- (m) describe and critique explanations of diversity in human sexual preference; &
- (n) critically evaluate popular and basic scientific writing about biology, ask insightful questions, and identify core ideas, misconceptions, and areas of ambiguity in such writing.<sup>\$</sup>

The symbols after many of the items correspond to the KSC IS outcomes listed in Part V of this syllabus.



# **The Science and Literature of Plants**

**Thinking and Writing: 101-01**  
**Fall Semester 2007**  
**Thursday 2–5:30**

Dr. Mark C. Long  
Department of English  
101 Parker Hall  
office phone 358-2695  
e-mail [mlong@keene.edu](mailto:mlong@keene.edu)

Office hours: TR 9-10; T 2-3;  
and by appointment

Dr. Kristen Porter-Utley  
Department of Biology  
331 Science Center  
office phone 358-2576  
e-mail [kporterutley@keene.edu](mailto:kporterutley@keene.edu)

Office hours: M 2-3, W 3-4,  
R 10-11; and by appointment

“To pay attention, this is our endless and proper work.”

—Mary Oliver

## **Course Description and Objectives**

The purpose of this course is to immerse you in the process of thinking and writing that you will be doing in college. Your work will be organized around the development of a semester-long writing project on the complex relationships between plants and people. This work will involve careful observation of the world around you, reading closely and critically, responding to and making use of the work of others, drafting and revising texts, and making what you have to say public.

You will be studying with a biologist and a writer who share a passionate interest in the science and literature of plants. Our collaboration is designed to draw on the intersections between the fields of botany and the environmental humanities to illuminate the complex interrelationships between plants and people. Our focus on plants will frequently take us outside the classroom, including field work in the bogs, alpine regions, and salt marsh ecosystems of New England. We will also explore how close attention to the natural world (with a particular emphasis on plants) alters our understanding of our place in nature by reading in the writings of Charles Darwin, as well as in the contemporary environmental writings of Michael Pollan, John Hay and Robin Kimmerer.

## **Required Reading**

Charles Darwin, *Charles Darwin: Norton Critical Editions*  
Michael Pollan, *The Botany of Desire: A Plant's Eye View of the World*  
Robin Kimmerer, *Gathering Moss: A Natural and Cultural History of Mosses*

## **Required Reference**

Diana Hacker, *A Writer's Reference*  
Lawrence Newcomb, *Newcomb's Wildflower Guide*

## **Reserve and Supplemental Reading**

Charles W. Johnson, *Bogs of the Northeast*  
Gary Paul Nabhan, *Gathering the Desert*

Michael Pollan, *The Omnivore's Dilemma: A Natural History of Four Meals*

Anthony Huxley, *Green Inheritance: Saving the Plants of the World*

John Hay, *The Way to the Salt Marsh: A John Hay Reader*

Individual projects will require students to work with additional materials.

### **Course Blackboard Site**

The course website will provide a forum for discussion and an archive of resources for developing individual projects. The Blackboard site is accessed through your MyKSC page or at <http://keene.blackboard.com/>.

### **Course Expectations and Requirements**

1) *Attendance is required.* We meet once each week. Hence a single absence will have a potentially devastating effect on your work in this class. Absences also affect the educational experience of other members of the course. If you must miss a class, please let one of us know in advance. *Note well that one absence will affect your final grade. If you miss more than two classes you will be ineligible to pass the course.* Please arrive a few minutes before class starts so that we can begin on time.

2) *Pre-class preparation and in-class participation is expected and required.* Successful students read carefully and thoughtfully the assigned readings and come to class prepared to discuss what they have read in class. To help you prepare for class, each week you will contribute your insights into the readings on Blackboard. In class, it is your responsibility to contribute to our intellectual work. Our responsibility, in turn, is to help you become active participants, and we will challenge you to develop the habits of mind that are keys to academic success: attentive listening, thoughtful in-class response, conversation with your professors in office hours and/or by e-mail, and engagement with your classmates. We expect that you will bring your experience and knowledge to the classroom so that we may learn from one another. And we encourage you to speak with one of us if you are having difficulties preparing for class, or if you would like to work more closely with one of us to become a more active participant in our work together.

*Required written work* will include: a) one 1-2 page Blackboard writing entry each week during the first nine weeks of the course b) in-class and field journal writing, and c) a writer's profile, and d) the final 15-20 page essay. You will be writing during every week of the semester. All written work must be typed, double-spaced, appropriately documented and submitted at the beginning of class on the due date. *Late papers will not be accepted.* Please keep all copies of your work—including drafts. Do not rely on one computer copy! *You must submit all required work in the final Writing Portfolio—including drafts—in order to pass the course.*

3) *Field work is expected and required.* In addition to preparing for and attending regular in-class meetings, we will be traveling together to three New England sites: a bog, an alpine area, and a salt marsh.

### **Evaluation and Grading**

The final course grade will be determined by attendance and participation, including consistent and thoughtful in-class and field work (50), the Blackboard forum postings and the field journal (50), and the writing project (300).

Individually and initially, the written documents will not receive a grade. However these documents will be subject to careful review and constructive commentary—both from us and from other members of the course. You will receive additional feedback in individual conferences

with a writing assistant. Based on our preliminary review of your work, we will assign a grade range at midterm. Your final grade will be based upon your participation, how well the materials in the final portfolio reflect your progress as a thinker and writer, and the quality of your final essay.

If you are a student with a disability: The Office of Disability Services (ODS), Elliot Hall, 8-2353, is available to discuss eligibility requirements and appropriate academic accommodations that you may require as a student with a disability. So all arrangements can be made, requests for academic accommodations need to be completed during the first two weeks of the semester. You are responsible for making an appointment with ODS for disability verification and determination of reasonable academic accommodations.

Success in this course begins with discovering an interest and enthusiasm for attentive reading, engaged dialogue and purposive writing. Should at any time you have a question or concern, please contact either Dr. Porter-Utley or Dr. Long, or drop by one of our offices to talk.

## Provisional Course Schedule

### Week 1      Thursday 30 August

- Thinking and writing
- Why the literature and science of plants?
- Introduction to course materials, Blackboard site, and resources
- Documentary series, *The Private Life of Plants*, "The Birds and the Bees"
- Introduction to the writing project
- On Reading Charles Darwin

### Week 2      Thursday 6 September

- Reading: selections from Charles Darwin, from *The Voyage of the Beagle* (1845), 67–81; *The Origin of Species* (1859), 95–174. Also read Phillip Appleman, "Darwin: On Changing the Mind," 3–20; Ernst Mayr, "Who is Darwin" 23–9; Gavin de Beer, "Biology Before the *Beagle*," 33–38
- Discussion: theories of evolution and natural selection.
- Class visit from Library faculty, Dr. Deng Pan: Introduction to the Mason library, staff and support, intellectual organization of library, browsing the stacks, periodicals and reference, Keene-Link, search engines and electronic resources, interlibrary loan
- Writing Workshop: Writing and illustrating in a Field Journal (observation, identification, pattern recognition, clarity and precision)
- Campus walk and observation exercise

### Week 3      Thursday 13 September      Trip to Ponemah Bog

- Readings: "Perceptions of Bogs" (1-6), "Basic Terms and Definitions" (7-18), and "The Carnivorous Plants" (111-24) in Charles W. Johnson, *Bogs of the Northeast* (Copies on Reserve in the Mason Library); Robin Kimmerer, "The Red Sneaker" in *Gathering Moss: A Natural and Cultural History of Plants*, 111–20
- We will distribute a checklist of what to bring with you for this half-day trip. Please make sure you have *Newcomb's Wildflower Guide* and your Field Journal.
- Writing Workshop (in the field)
- Discussion of topic selection and project proposals

**Week 4            Thursday 20 September**

- Readings: Charles Darwin, *The Origin of Species* (1859), 95–174; National Academy of Sciences, “Evolution and the Nature of Science (1999), 289–300; Lewis Thomas, “On the Uncertainty of Science (1980), 304–07; Peter R. Grant, “Natural Selection and Darwin’s Finches” (1991), 377–83
- View video excerpts from documentary series *The Private Life of Plants*, “It’s A Jungle Out There”
- Writing Workshop: Motivation and Purpose, Context and Audience
- DUE: Field Journals; 2-3 page Project Proposal
- Small Group Conferences (during week) with Dr. Pan and Dr. Long or Dr. Porter-Utley: Developing a search strategy and determining pathways to possible resources

**Week 5            Thursday 27 September                      Trip to Alpine Area**

- Readings: Robin Kimmerer, *Gathering Moss: A Natural and Cultural History of Mosses*, 1–81
- We will distribute a checklist of what to bring with you for this half-day trip. Please bring *Newcomb’s Wildflower Guide* and your Field Journal.
- Writing Workshop (in the field)

**Week 6            Thursday 4 October**

- Readings: Robin Kimmerer, *Gathering Moss: A Natural and Cultural History of Mosses*, 82–162
- Discussion: Science and/in Environmental Literature
- DUE: Field Journals; Research Installment #1 with Annotated Bibliography of sources
- Writing Workshop: Writing with Sources

**Week 7            Thursday 11 October**

- Readings: Michael Pollan, “Desire: Sweetness / Plant: The Apple,” 1–58, “Desire: Beauty / Plant: The Tulip,” 59–110 in *The Botany of Desire* and “Industrial Corn” in *The Omnivore’s Dilemma* (Handout)
- Discussion
- Writing Workshop: On Building an Essay
- DUE: Field Journals; Research Installment #2 with Annotated Bibliography of sources
- Writing Workshop: Class visit from Library faculty, Dr. Deng Pan: Evaluating the relevance and usefulness of information, organizing relevant information, citing sources, understanding intellectual property and plagiarism

**Week 8            Thursday 18 October            Trip to Coastal Salt Marsh**

Sheila Roberge, and Kathy Mills from the Great Bay National Estuarine Research Reserve will be our guides. We will also have the opportunity to preview the “Great Bay Show,” an exhibit of artwork depicting the inland estuary

- Readings: John Hay, “Who Owns the Beach,” 52–62, and “An Unimagined Frontier,” 43–51, in *The Way to the Salt Marsh: A John Hay Reader* (Copies on Reserve in the Mason Library)
- We will distribute a checklist of what to bring with you for this half-day trip. Please bring *Newcomb’s Wildflower Guide* and your Field Journal.
- Writing Workshop (in the field)

**Week 9            Thursday 25 October**

- Readings: Michael Pollan, *The Botany of Desire*, “Desire: Intoxication / Plant: Marijuana,” 111–180, “Desire: Control / Plant: The Potato,” 181–238
- Writing Workshop: DUE: Field Journals; 10-15 page first version of the essay
- Writing Center visit

**Week 10      Thursday 1 November**

- Writing Center Tutor Conferences (during the week)
- Writing Workshop: Peer Review and Discussion

**Week 11      Thursday 8 November**

- DUE: 10-15 page second version of the essay
- Panel Presentations and Discussion

**Week 12      Thursday 15 November**

- Individual Conferences (Friday-Wednesday) with Dr. Porter-Utley or Dr. Long. Please bring a revised copy of your essay to the conference
- Panel Presentations and Discussion
- Preparing the abstract for the Keene State College Academic Excellence Conference

**Week 13**

- Thanksgiving Break

**Week 14      Thursday 29 November**

- The Literature of Plants: Readings and Discussion (TBA)
- The Writer's Profile
- Preparing the Writing Portfolio

**Week 15      Thursday 6 December**

- The Literature of Plants: Readings and Discussion (TBA)
- DUE: 15-20 Page Final Version of essay with Writing Portfolio

**Finals Week      Thursday 13 December**

- The Writing Portfolio will be returned during the scheduled finals class period that begins at 3:30

## **Appendix 9.**

### **Letter to the Dean Regarding Concerns Over Freshman Research Program and Suggestions For Change**





School of Sciences and Social Sciences

**Keene State College**

229 Main Street, Keene, New Hampshire 03435-2001  
603-358-2544 [www.keene.edu/science](http://www.keene.edu/science)

Dear Gordon,

The Biology Department is writing this letter in response to your recent Strategic Plan Initiative Proposal: *Undergraduate Research Scholars Program for Entering Students*. Thank you for sending us a copy of the proposal so that we may better understand the proposed program and, perhaps, provide you with some additional feedback.

First of all, the Biology Department would like to see an undergraduate research recruitment program succeed at Keene State College (KSC), and we support the spirit of your Strategic Plan Initiative Proposal. The proposal is certainly student-centered and the program might attract students to KSC and contribute positively to the departments in which those students do research. Nevertheless, we do have several major concerns about the proposal.

The faculty members in the Biology Department carefully read your proposal and were surprised that the proposal does not address, in any way, how the faculty would be impacted by, or play a part in, the proposed program. Nor does it recognize current faculty research and mentorship. Many faculty members in the Biology Department have been working with undergraduates at all levels (first-year to senior) on a variety of professional and peer-reviewed scientific research projects. In fact, we take great pride in offering our students many opportunities to engage in high-quality and intensive scientific research outside of the classroom. Evidence of this can be seen in our student presentations at local and national conferences and through successful grant applications that include student researchers. Additionally, most faculty engaging in research endeavors with students often do not receive any recognition of, or compensation for, these efforts.

Contrary to popular belief, working with students in our research laboratories does not permit faculty to be more productive in their research. More often than not, working with students in the lab takes additional time and resources that faculty members would not expend if they were to do the work themselves. Faculty members working with undergraduate researchers are required to spend a tremendous amount of time with their students both in and out of the lab. Most faculty members start working with their students outside of the lab by having them read papers, write undergraduate research grants, put together lab protocols, etc. Once in the lab, the inexperienced student has to be taught very basic lab techniques and has to be shown how to do things several times before they have the confidence to work on their own. Even when a student starts to work more on his/her own, the faculty member still often has to run down to the lab to "take a look at something" or troubleshoot a method. We do not agree that advanced students will necessarily be good mentors for first year students. Even upper-level students who have been working in the lab for several years need significant guidance from the faculty; several of our advanced students have made costly mistakes in the lab. We have to remember that even these upper-level students are still learning and are quite inexperienced. Lastly, if a student is working on a project that utilizes potentially dangerous materials or sensitive materials (IACUC projects), a situation that is more common in biology than not, the faculty member also has a responsibility to be in or near the lab to supervise all of their students. Despite this, we work with student researchers because we believe, and have evidence to support the fact, that research gives our students a chance to learn beyond the classroom. Additionally, we have noticed that students who engage in research in our department as undergraduates are more competitive candidates for postgraduate positions and employment.

We strongly feel that the faculty who participate in the program deserve to be compensated for their work with undergraduate researchers. It not only takes a great deal of time for faculty members to personally work with undergraduates in the lab, but the faculty member has to organize the projects in the lab and make sure that the lab is well-stocked with the appropriate supplies (some of which can cost up to \$1000 per month). We are also concerned that those of us who are already working with student researchers might be responsible for providing research opportunities to the incoming students when we already feel overwhelmed with our current teaching load and undergraduate research work. How might we be compensated for this increased work load? Why aren't the faculty given stipends for the work they do with students during the summer? Most teaching schools similar to KSC (e.g., Western New England College and the University of New England) recognize the time commitment of research and award, through course reassignment, those engaged in active

research. There are many ways to compensate the faculty for the increase in load. For example, the faculty can be offered course reassignments, stipends, and/or reduction in service responsibilities. The faculty could also be supported through the cooperative education program.

We are also concerned about the way the students in the program will be compensated. Students, particularly those who will likely be the most dedicated and successful participants in the program, should find that being given the opportunity to work with faculty members on research projects is reward enough for their efforts. In fact, some of us have found that students reinforced with money often do not perform well in research settings; in order for students to be good scientists, they have to be interested in their work and committed to increasing scientific knowledge. Instead of a stipend, the College could grant student program participants special academic credit or present them with an honorary award for their work. We understand that many of our students have to be employed elsewhere in order to pay for their academic work at KSC. Perhaps KSC can find a way to give these particular students a financial award that will allow them to spend their time working on a scientific research project rather than at a local restaurant or retail store; however, we feel that such an award should be available to upper-level students and not just incoming first year students. Giving incoming students a blanket stipend for lab work that they have not yet begun would compromise the collaborative and mutually supportive atmosphere in the lab, as some students would be getting a stipend while others would receive no such monetary compensation. This would be discouraging to upper-level students, particularly if part of their responsibility is to help train the incoming students who have stipends. Perhaps summer stipends can be offered to select students who have proven that they are dedicated to the project they have been working on during the regular academic year; regardless, all students (both upper- and lower-level) should be able to apply for the summer paid positions.

The Department of Biology is also concerned that the proposal did not establish any expectations for the students participating in the program. Currently, faculty members in the Biology Department establish clear expectations for students engaged in research. Students must work a certain number of hours per week, spend time reading appropriate literature related to their project, schedule regular meetings with their faculty advisor, write undergraduate research grants, and present their work at local and national conferences. What are the obligations and expectations of students participating in the proposed program? Who will identify these obligations and expectations?

The college also has to determine how the students in the program will apply for the program and how students will be chosen out of this applicant pool. We believe that it is important that the faculty members who will be working with the students get to interview and offer a lab position to particular candidates. We do not want students working in our labs if they do not want to be there. The advantage to the existing undergraduate research program in the Biology Department is that the faculty members can choose to recruit students who have shown initiative and interest in their classes; this will not be the case with the proposed program. One model used by faculty members at KSC and elsewhere is as follows: 1) first year students individually approach or are approached by a faculty member and may serve as volunteers in the lab for a minimum of one semester; 2) those students who show dedication and initiative may then be asked to remain in the lab and learn more complex techniques and start to write their undergraduate research grants; 3) once funded, the students may then start (or continue) to conduct their research and begin presenting their preliminary results at the AEC and other local conferences; 4) depending on the nature of the research, upper-level students may assist in the training of other students and prepare for national or international conferences. This type of program is rigorous for both the faculty and student researcher, but benefits both tremendously.

The Biology Department is fully supportive of undergraduate student research, as evidenced by the dozen or more students currently working on various research projects in the department, and we fully support new efforts to increase student learning outside of the classroom. Nevertheless, due to the major concerns outlined above, as well as numerous minor ones not mentioned in this letter, we cannot support the proposal in its current form and will not participate in the program if it goes forward as proposed. We agree with the intended outcomes of this proposal but have an alternative model to propose that we feel will be more successful at achieving those outcomes. Because we value student participation in research, we feel the need to raise these concerns in hopes that constructive criticism can lead to a successful and beneficial program for all.

Thank you,  
The Biology Department

**Keene State College • Verification of Faculty/Staff Review**

Each full-time faculty member or staff member on duty in the Program of BIOLOGY  
has been asked to sign the statement presented below:

By my signature below, I am verifying that I have had the opportunity to review the program's self-study that is being presented to the College's Program Review Subcommittee.

Signature	Date	Additional Response in Appendix	
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<u>[Signature]</u>	<u>9/29/09</u>	Yes _____	No <u>X</u>
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<u>Scott J. Strong</u>	<u>9/29/09</u>	Yes _____	No <u>X</u>
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<u>[Signature]</u>	<u>9/29/09</u>	Yes _____	No <u>X</u>
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<u>Kenneth D. Begun</u>	<u>9/28/09</u>	Yes _____	No <u>X</u>
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<u>Loren Lannon</u>	<u>9/28/09</u>	Yes _____	No <u>X</u>
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<u>[Signature]</u>	<u>9/28/09</u>	Yes _____	No <u>X</u>
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**Forms**

The following data will be utilized by the program to assist in the description and direction of its program. Data should be tabulated and presented in summary form.

**Faculty Information:**

Rank Distribution

Professor \_\_\_\_\_ Associate \_\_\_\_\_ Assistant \_\_\_\_\_ Instructor \_\_\_\_\_

Tenure Track \_\_\_\_\_ Tenured \_\_\_\_\_ Non-tenured \_\_\_\_\_

Highest Degree

Ph.D./Ed.D./Equiv. \_\_\_\_\_ M.S./M.A./Equiv. \_\_\_\_\_ B.S./B.A./Equiv. \_\_\_\_\_

Length of Service at KSC (years)

0-5 \_\_\_\_\_ 6-10 \_\_\_\_\_ 11-15 \_\_\_\_\_ 16 or more \_\_\_\_\_

Specialization (List Areas)

**Part-Time Faculty and Adjunct Faculty:**

Course load (credits per year)

0-3 \_\_\_\_\_ 4-6 \_\_\_\_\_ 7-9 \_\_\_\_\_ 10-12 \_\_\_\_\_ 13 or more \_\_\_\_\_

Highest Degree

Ph.D./Ed.D./Equiv. \_\_\_\_\_ M.S./M.A./Equiv. \_\_\_\_\_ B.S./B.A./Equiv. \_\_\_\_\_

Specialization (List Areas)

Length of Service at KSC (years)

0-5 \_\_\_\_\_ 6-10 \_\_\_\_\_ 11-15 \_\_\_\_\_ 16 or more \_\_\_\_\_

See self  
study

**Student Information:**

Majors \_\_\_\_\_

Options (list) \_\_\_\_\_

Specializations (list) \_\_\_\_\_

Minors \_\_\_\_\_

Undergraduate \_\_\_\_\_ Graduate \_\_\_\_\_

Independent Studies \_\_\_\_\_

Other (General Education, Interdisciplinary, Service to other Programs) \_\_\_\_\_

Age

17-23 \_\_\_\_\_ 24-29 \_\_\_\_\_ 30-39 \_\_\_\_\_ 40 - \_\_\_\_\_

Gender

Female \_\_\_\_\_ Male \_\_\_\_\_

See self  
study