

# **Program Review**

A PROCESS FOR  
SELF-EVALUATION  
AND  
CONTINUOUS IMPROVEMENT

Department of Biology and Horticulture

Biology and Biotechnology Sections

2016-2017

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# Bergen Community College

## **PROGRAMS: The Biology and Biotechnology Program**

(Both programs are academic subsets of the Department of Biology and Horticulture)

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**DATE OF THIS REPORT:** June 2017

**PERIOD OF YEARS BEING REVIEWED:** 2012/13 to 2016/17

### **OVERVIEW**

State the mission of the program, describe program goals and objectives, describe the relationship to overall college mission and goals, ...

### **Mission Statement**

The mission of the **Department of Biology and Horticulture** at Bergen Community College is to establish a high quality biological science or horticultural education for all of our students. The department is committed to excellence in our teaching so that our students acquire:

A fundamental knowledge of basic facts and theories in biology in order to pursue a career in science or allied health;

Essential scientific knowledge for non-science majors such that these students will be able to understand scientific concepts in contemporary society;

An ability to critically analyze information using scientific reasoning;

Effective communication skills;

<http://bergen.edu/academics/academic-divisions-departments/biology-horticulture/biology/>

The Associate of Science in Biology degree program (**AS.NSM.BIO**) prepares students to enter various biology and biology related programs leading to a bachelor's degree in four year colleges and universities. The recommended program stresses instruction in basic concepts in biology,

chemistry and mathematics. Students will acquire laboratory skills that are necessary for upper division studies in the biological sciences.

The Biology Department offers elective courses which enable students to concentrate on organismal biology, ecology and environmental biology, or biotechnology. We also offer Anatomy and Physiology and Microbiology courses for students interested in the health professions and/or medical, dental or chiropractic schools.

### **AS.NSM.BIO Program Learning Goals/Outcomes:**

1. Students will be experienced in the organization and classification principles employed in biological sciences.
2. Students will acquire knowledge of the physiological and biochemical processes in a variety of organisms and the interrelationships of living systems.
3. Students will be knowledgeable in the developmental processes which occur in various organisms.
4. Students will have a heightened understanding of the unity, variety and evolution of life, and recognition of the importance of the stewardship and preservation of biological diversity.
5. Students will acquire laboratory competence by developing and refining technical and analytical skills.
6. Students will have the ability to critically examine information and discover new knowledge through rigorous scientific reasoning.

Our program mission and goals correspond with the vision and mission of the college since our students will be well equipped to transition to four year colleges and universities to continue their education in the biological sciences or other STEM programs. We also have courses for students pursuing careers in the health professions, so students taking Microbiology, Anatomy and Physiology are well prepared with foundational knowledge in the health professions curriculum.

Our economy currently has more employment opportunities for students who graduate with degrees in the STEM disciplines and health care careers.

The Associate of Science in Biotechnology degree program (**AS.NSM.BIO.TECH**) is designed to prepare students interested in transferring to a bachelor's degree program in Biology with a specialization in Biotechnology or enter the workforce as a laboratory technologist in the field. Students in the program take a year of General Biology, a two semester sequence in Biotechnology and Bioinformatics plus a foundation of supporting Mathematics, Science and General Education courses.

## **AS.NSM.BIO.TECH Program Learning Goals/Outcomes:**

1. Students will demonstrate knowledge of the methodology of biotechnology, including genetic modification, isolation, purification, and analysis of nucleic acids and proteins.
2. Students will acquire the skills necessary to properly handle genetically modified organisms and employ the safeguards necessary when working with such organisms.
3. Students will acquire laboratory competence by developing and refining technical and analytical skills.
4. Students will develop the ability to critically examine information and discover new knowledge through rigorous scientific reasoning.
5. Students will demonstrate knowledge of the practice of proper scientific laboratory record keeping.
6. Students will acquire knowledge of a variety of currently available genomic and proteomic databases.
7. Students will acquire the skills required to analyze biological sequences and interpret the results of their analyses.

Our program mission and goals correspond with the vision and mission of the college since our students will be well equipped to transition to four year colleges and universities to continue their education in biotechnology or other STEM programs. Our Biotechnology concentration is also designed to give students, or current employees in the pharmaceutical industry hands-on experience in innovative technologies. Since our economy currently has numerous employment opportunities for students who graduate with degrees in the STEM disciplines and health care careers, our Biotechnology concentration is well-suited to prepare our students to capitalize on these opportunities.

Our economy currently has more employment opportunities for students who graduate with degrees in the **Science, Technology, Engineering, and/or Mathematics (STEM)** disciplines and health care careers.

Detailed information can be found at [http://bergen.edu/wp-content/uploads/CIE-Biology-AS.NSM\\_BIO-AR2014-2016.pdf](http://bergen.edu/wp-content/uploads/CIE-Biology-AS.NSM_BIO-AR2014-2016.pdf)

Bergen Community College is accredited by the **Middle States Commission on Higher Education**, 3624 Market Street, Philadelphia, PA 19104; (215) 662-5606. The Commission on Higher Education is an institutional accrediting agency recognized by the U.S. Secretary of Education and the Commission on Recognition of Postsecondary Accreditation. This statement is taken from the college web site under the *About Bergen Community College Accreditation* subsection.

<http://bergen.edu/about-us/accreditation/>

## SUMMARY OF SIGNIFICANT DEVELOPMENTS SINCE LAST PROGRAM REVIEW

Provide a brief summary of significant developments since the last program review, with particular emphasis on challenges identified by the previous team, accomplishments relating to the action plans, any work yet to be done, ...

We opened two **new laboratories** (LYN-514 and LYN-515) and a prep room on the fifth floor of our new southern campus building in Lyndhurst, New Jersey. LYN-514 is for our anatomy and physiology courses (BIO-103: *The Human Body*; BIO-107: *Introduction to the Human Body*; BIO-109 *Anatomy and Physiology I*; and BIO-209: *Anatomy and Physiology II*) and LYN-515 is for BIO-108: *Introduction to Environmental Biology* and BIO-130: *People Plant Relationships* and a few other Horticulture courses. We also opened a new prep room on the fifth floor, S-512, and a storage room, S-513.

We started the **Bergen Molecular Ecology Group (BMEG)**. This research group provides the opportunity for students to participate in collaborative research under the supervision of faculty members Dr. Elena Tartaglia, Dr. Luis Jimenez and Professor John Smalley. These faculty members introduce Biology and Biotechnology majors to real lab situations. They assist the students with developing actual hypotheses, conducting actual experiments, collecting meaningful data, analyzing the data, developing a conclusion and/or summary, and developing a clear and informative presentation, and constructing informative posters. These students then attend meetings in which they not only present their findings but also win awards\*. This brings Biology to the forefront of the students' experience at **Bergen Community College**. We encourage **STEM** students to participate in this research program. **STEM: Science Technology Engineering Mathematics**.

\*Our **BMEG/STEM** student Joy Bochis won first place for her work on Direct PCR Detection, Cloning, and Characterization of Mold Populations from Soils and Compost.

\*Our **BMEG/STEM/B2B** student Stephanie Zapata won second place for her work on Direct PCR Detection, Cloning, and Characterization of Bacterial RubisCO Genes from New Jersey Soils.

Both award winning posters were presented at the 49th Annual Fall Conference of the Metropolitan Association of College and University Biologists (MACUB) meeting, October 29, 2016, SUNY, Old Westbury, NY.

We received the **Bridges to Baccalaureate (B2B)** grant. This grant is funded by the **National Science Foundation (NSF)**. The goal of the grant is to increase the number of minority STEM students (Spanish, Black, American Indian, Native Hawaiian and South Pacific Islander) transferring from Bergen Community College to a 4 year College. <http://bergen.edu/b2b/>

### **STEM Grants:**

**STEM GPS** stands for **Science Technology Engineering Mathematics Graduation Pathway to Success**. The original STEM grant was dedicated to providing academic and transfer counseling to

all STEM students at BCC. It focused on providing the best possible services and information to students in order to help them successfully complete their degree at Bergen Community College and transfer to a 4-year institution. <http://bergen.edu/faculty-staff/grants-administration/awards/stem/the-stem-gps-team/>

Bergen Community College has a **STEM Mathematics –Science** walk-in center on the first floor of the Pitkin Education Building for students that need assistance with their science or mathematics courses. The STEM Mathematics – Science walk in center is located in L-131. There is also a STEM Lab on the third floor for students to receive tutoring and participate in STEM lab activities. The STEM lab is in S-315. <http://bergen.edu/current-students/student-support-services/tutoring/math-science-walk-in-center/>

### **STEMatics Grant:**

Bergen Community College received a \$5.3 million dollar Hispanic-Serving Institution Science, Technology, Engineering and Math (**STEM**) grant from the U.S. Department of Education to help students succeed in the STEM fields. **Goal 1:** To increase the recruitment and persistence of STEM students at BCC as well as of students in the Education A.S. Program who are preparing to become science/math teachers. **Goal 2:** To improve the graduation rates as well as the transfer rates to four-year institutions of students enrolled in STEM programs as well as of students enrolled in the Education A.S. Program at BCC. **Goal 3:** Enable more Data-Based Decision making to improve student outcomes and inform program development and articulation. <http://bergen.edu/faculty-staff/grants-administration/awards/stem/>

### **STEM Student Scholars Program:**

The STEM Student Scholars Program's purpose is to promote excellence in knowledge, skills and ability of a select group of STEM students to ensure their success in securing research internships and successful transfer to their targeted 4-year institution. <http://bergen.edu/faculty-staff/grants-administration/resources/science-technology-engineering-and-mathematics/>

We **renovated** all six of our (biology) laboratories on the second floor and added three renovated laboratories on the third floor of the **Pitkin Education Building**. During the renovation period, there was no decrease in the number of sections offered or lab spaces in which to schedule them.

We opened a **Biotechnology laboratory** on the second floor of the Pitkin Education Building in S-216;

We **renovated** two lab prep rooms on the second floor (S-208 and S-224) and one prep room on the third floor (S-308);

We also **renovated** three other prep rooms and opened two storage rooms on the second floor.

We opened one **Laboratory Technician Office** on the second floor (S-220) and one on the third floor (S-307).

We opened a **Microscope Room** on the second floor (S-220B); this room is for microscope storage and all microscope repair and support needs;

We have developed an excellent program for the proper **disposal** of our biological and chemical waste products. Please see **Appendix 3** for detailed pick-up locations. This sheet is posted in all prep and office locations.

Professors Robert Highley as Biology ADC and Marty Lowe, BIO-104 *Microbiology* course coordinator, completely revised the safety rules for BIO-104 to be compliant with the 2009 CDC/ASM recommendations in the hyperlink below. This was a tremendous effort and we think that we are a model lab for Microbiology safety as a result of their work. Source information: [Biosafety in Microbiological and Biomedical Laboratories \(BMBL\) 5th Edition](#)

We are in the process of acquiring two **synthetic cadavers** for use in our BIO-109 and BIO-209 *Anatomy and Physiology I and II* courses. The cadavers will replace the need for cats in our A and P II course.

We purchased, with grant funding, a computerized anatomy and physiology **computer system** for use by students in our Anatomy and Physiology labs.

There have been two Full-Time **faculty retirements** in the last year; the college has not yet allowed us to begin a search to replace them.

**We no longer have faculty lecturers.** Our department lost six faculty lecturers. Lecturers are full-time, non-tenure track instructors. They were allowed to teach up to 21.0 hours in a fall or spring semester and up to 6.0 or 9.0 hours during the summer sessions. This loss increased the reliance on adjunct faculty instructors to cover the hours left over by the elimination of the lecturers. Adjunct faculty are only allowed to teach up to 9.0 hours. If they teach two sections together, a B-mode, they receive a 1.5 hour adjustment that brings them to 10.5 hours. This requires the department to hire many more adjunct instructors to cover those lecturer hours. It has become and continues to be more difficult to find qualified adjunct instructors to cover these hours.

We added two **new biology electives**: BIO-224 *Environmental Microbiology* and BIO-225 *Invertebrate Zoology* to the list of electives that students seeking a degree in Biology can choose to take.

In 2016, we were granted a chapter of the **Biology Honor Society**: Beta Beta Beta, the National Honor Society for Undergraduate Biology.  $\beta \beta \beta$  (Tri-Beta) is a National Honor Society for undergraduate students of Biology with chapters at colleges and universities nationwide. Members of the society graduate with honors in Biology.

Bergen Community College has implemented an **Institutional Review Board (IRB)**. This board was developed with the input of Professor Judith Fitzpatrick of the Department of Biology and Horticulture. An IRB reviews research proposals from faculty, students, or of other members of the college community that collect information about participants. Federal Guidelines guide the proposal process. <http://bergen.edu/faculty-staff/grants-administration/institutional-review-board/>

## FOCUS ON STUDENTS

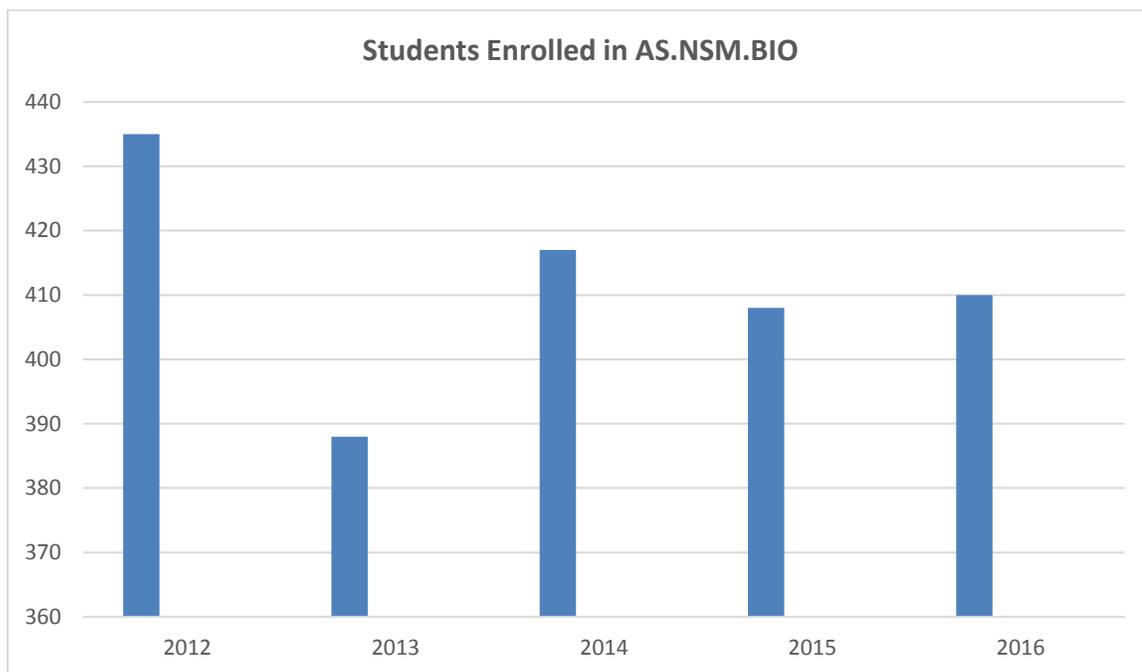
Reflect on the degree to which the program is meeting student needs. Comment on each of the following categories. Some considerations are given after each category—**please comment on only those which are applicable to this program.**

### Demographics

[Analysis or examination of the demographics of the students enrolled, special populations being served or not being served, trends and patterns of enrollment, comparisons to other colleges and national trends, ...]

**AS.NSM.BIO** is the degree abbreviation under which our Biology students would be listed: Associate in Science.Natural Sciences and Mathematics.**BIO**logy.

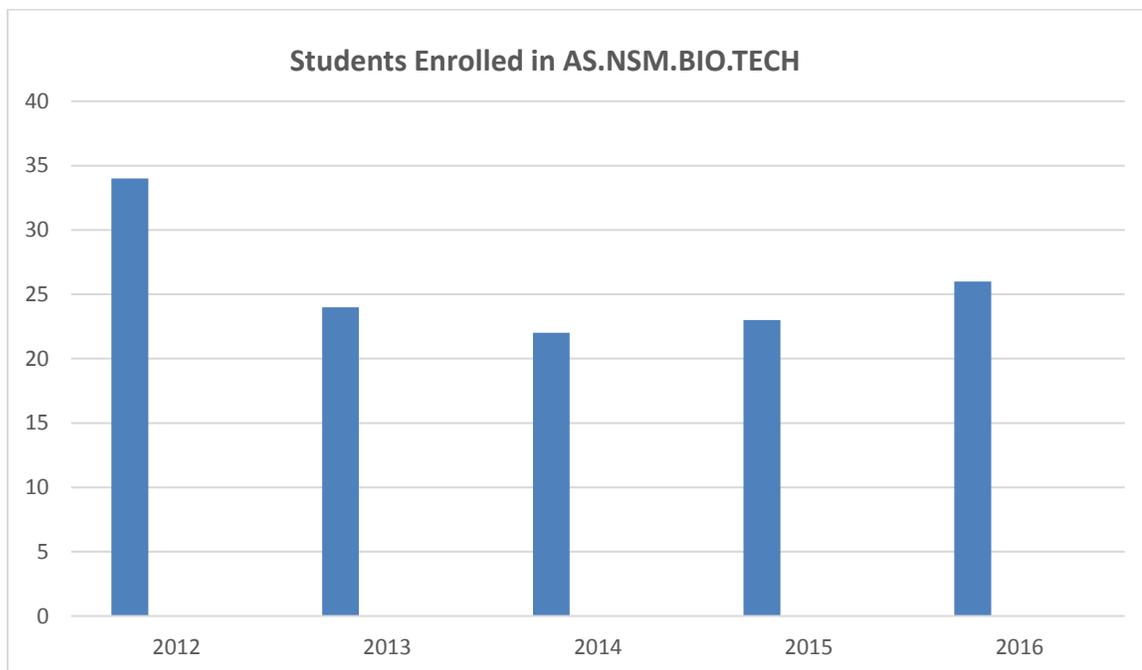
**AS.NSM.BIO Enrollment:** During the last five years, there have been 2,058 students enrolled as biology degree students: 435 in 2012, 388 in 2013, 417 in 2014, 408 in 2015 and 410 in 2016. The largest group, during this time period, was Unknown Race/Ethnicity 26.1% (107), the second largest group was Hispanic, all races, 23.7% (97), while the third largest group was White at 22.9% (94). The large majority, 63.2% (259), of biology students were 18 – 21 years old. When gender is considered, 61.5% (252) of our biology students are female and only 36.3% (149) are male. Data compiled from Bergen Community College Fact Books, 2012-2016  
<http://bergen.edu/about-us/institutional-effectiveness/institutional-research/fact-books/>



Source: Bergen Community College Fact Books, 2012-2016.

**AS.NSM.BIO.TECH** is the degree abbreviation under which our Biotechnology students would be listed: Associate in Science.Natural Sciences and Mathematics.**BIO**logy.**TECH**nology

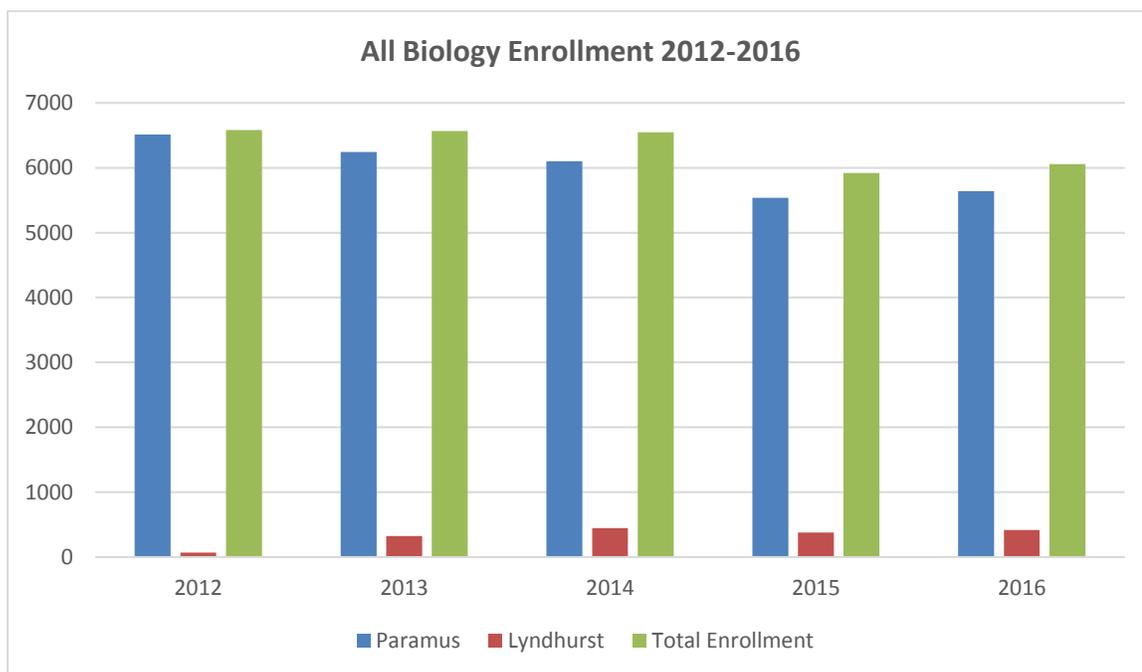
**AS.NSM.BIO.TECH Enrollment:** During the last five years, there have been 129 students enrolled as biotechnology degree students: 34 in 2012, 24 in 2013, 22 in 2014, 23 in 2015 and 26 in 2016. The enrollment has remained somewhat steady. The largest group, during this time period, was Unknown Race/Ethnicity 34.1% (44), the second largest group was Hispanic, all races, 26.3% (34), while the third largest group was White at 22.5% (29). The large majority, 53.5% (69), of biotechnology students are 18 – 21 years old. When gender is considered, 52% (67) of our biotechnology students are male and 47% (60) are female. Two students were unknown. Data compiled from Bergen Community College Fact Books, 2012-2016.  
<http://bergen.edu/about-us/institutional-effectiveness/institutional-research/fact-books/>



Source: Bergen Community College Fact Books, 2012-2016.

### Overall Biology Enrollment

The total Biology enrollment (Paramus and Lyndhurst Campuses) five year average between 2012 and 2016 has decreased approximately 8% (527 students). The Paramus Campus decline was approximately 13% (877 students). The Lyndhurst Campus has had an **increase** from 69 students in 2012 to 445 in 2014 and settled back to 419 in 2016. This is a 507% overall increase from 2012 to 2016 (350 students). Figures compiled from Department Section Availability Reports (**SAR**), 2012-2016.



Source: Department Section Availability Reports, 2012-2016.

## Student Scholarships

A wide variety of merit and need-based scholarships are available to Bergen’s students. All students, biology majors included, can apply for scholarships via the Bergen Community College Foundation’s consolidated online application management system. This application system enables students to input their specific information, then view and apply for scholarships matched to their individual eligibilities.

There are two scholarships specifically available for students pursuing a major in biology. The Dr. Seymour Lewis Endowed Memorial Scholarship provides an annual award to a student with a concentration in biology who demonstrates “exceptional abilities and limited resources.” The Helen and Walter Fitzpatrick BioScience Scholarship provides awards to one or several students who have successfully undertaken at least eight credits in a science major, maintain a minimum G.P.A of 3.0 or higher, are pursuing a degree in Biology and demonstrate financial need.

Two scholarships are also available for students pursuing a degree in Horticulture. The Jacob “Jack” Fischer Horticulture Award provides two awards of \$500 each to horticulture students who demonstrate “academic excellence and contributions to the program.” The Peter S. Snell Endowed scholarship awards \$500 to a graduating horticulture student who demonstrates both an excellent record of academic achievements as well as financial need.

In addition, Biology students are also eligible for the Harold Winn Memorial Scholarship, which annually awards a student who maintains a minimum GPA of 3.0, demonstrates financial need and is pursuing a degree in science, health science, social work or psychology.

Full information can be found at [http://bergen.edu/?s=Student scholarships](http://bergen.edu/?s=Student%20scholarships)

## Student Satisfaction

[Student surveys of enrollees, transfer students and/or graduates (program-specific or institution-level), qualitative measures for example focus groups or interviews, ...]

Only four students, three in 2013 and one in 2014, responded to the Graduate's Answers to Main Graduate Follow-up Survey. The students were full time and no longer enrolled. They transferred to Montclair State University and William Paterson University. The students felt that the biology courses were a good preparation for their future education. No comments were provided by the students for the Comments section. Data compiled from Bergen Community College Fact Books, 2012-2016.

Two graduates responded to the Graduate's Responses to the Graduate Transfer Experience Survey, both in 2014. One student responded "Wish I would have received more mentoring on how were credits transferred (i.e. what is accepted and what is not)". The other student commented that "Bergen Community College has exceeded my expectations. The transition to a four year university was very smooth". Data compiled from Bergen Community College Fact Books, 2012-2016.

<http://bergen.edu/about-us/institutional-effectiveness/institutional-research/fact-books/>

## Learning Outcomes Assessments

[Documented outcomes, degree of faculty participation in regular assessment activities, results of assessments, what has been learned from assessments, what has changed as a result of assessments, what plans are there for changes in the future, are there appropriate feedback loops to improve student learning, ...] Please fill out the chart below and include copies of recent assessment reports.

The assessment information found below was collected and developed since the last program review.

Program Learning Outcomes (include all program outcomes that are listed in the Academic Catalog )	Describe how the outcome has been directly assessed in the last five year period.	What have been the results of that assessment? What changes have been made as a result?
Students will be experienced in the organization and classification principles employed in biological sciences		
Students will acquire knowledge of the physiological and biochemical processes in a variety of organisms and the interrelationships of living system		

<p>Students will be knowledgeable in the developmental processes which occur in various organisms</p>		
<p>Students will have a heightened understanding of the unity, variety and evolution of life, and recognition of the importance of the stewardship and preservation of biological diversity</p>	<p>Since there are no standardized exams which would encompass application of evolution and biological diversity covering the mastery courses; our department chose to use a direct method of assessment in the form of locally</p>	<p>Results indicate that some of the questions in the assessment did not get 70% correct responses. The assessment will be repeated in the 2016-2018 cycle with the modifications below:</p> <p>Assessment questions will be reviewed for clarity, and instruction will be modified in order to more clearly convey the related curricula material. Modifications for instruction will include investigating more specific examples in class and laboratory through video, podcast, collaborative activities and utilizing case studies related to the topics which were deficient in the results section. Supplementary homework and class assignments may also be implemented.</p>
<p>Students will acquire laboratory competence by developing and refining technical and analytical skills</p>		
<p>Students will have the ability to critically examine information and discover new knowledge through rigorous scientific reasoning</p>		

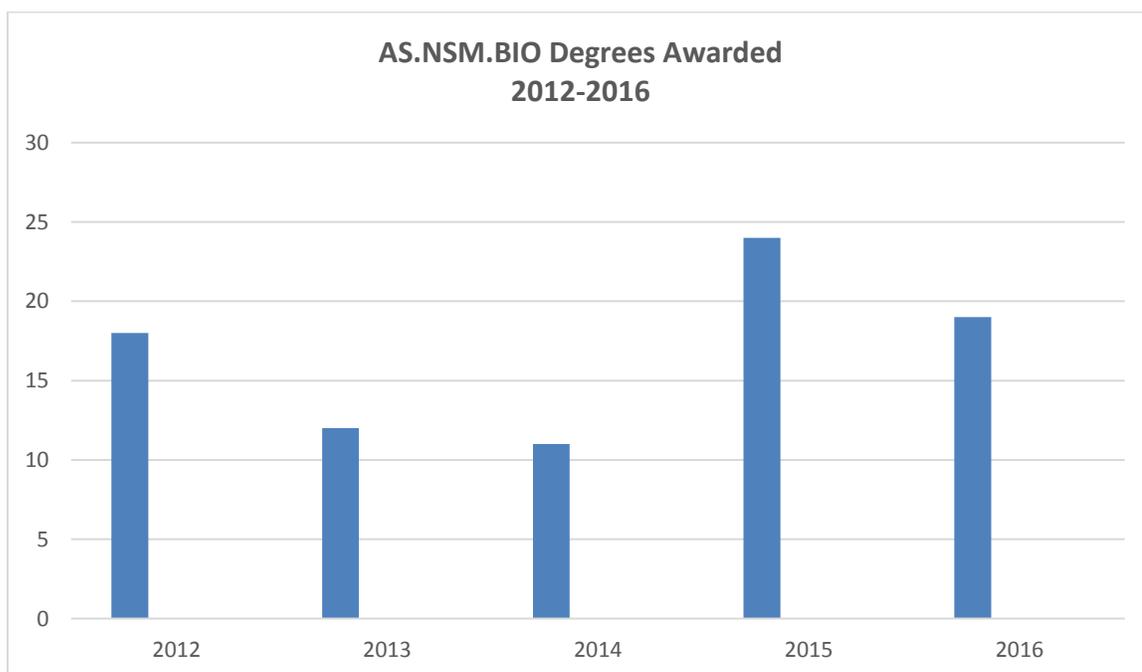
Since not all of the faculty members teach the “Mastery” courses for the AS.NSM.BIO degree, the following faculty were directly involved in the assessment data collection and report writing: Professors Dill, Tartaglia, Sontag, Jimenez, Smalley, Flannery, and Highley. Even though other department members were not directly involved in data collection, all members were distributed reports, received updates at department meetings and offered feedback to improve the process.

### Student Success

[Retention and completion rates, placement data, comparison to other colleges in New Jersey and national trends, transfer rates and/or transfer success, graduates’ perspectives, employers’ perspectives, degree to which students succeed at next educational level, degree to which diverse populations succeed, ...]

**AS. NSM.BIO Graduates:** During the last five years there have been a total of 84 students that received Biology degrees from Bergen Community College: 18 in 2012, 12 in 2013, 11 in 2014, 24 in 2015, and 19 in 2016. As shown below, the number varies from year to year: on average, there have been approximately 17 biology graduates each year for the last five years. The largest group in total was Hispanic, all races 26.2% (22) and the second largest group in total was White at 22.6% (19). 15.5 percent (13) of the students were non-resident alien and 14.3% (12) were unknown. The largest group by age was the Under 22 years old group at 38.1% (32), second was 22 – 24 years old at 34.5% (29) and third was 25 – 34 years old at 23.8% (20). During this time period, 44.0% (37) were male students and 56.0% (47) were female students. Data compiled from Bergen Community College Fact Books, 2012-2016.

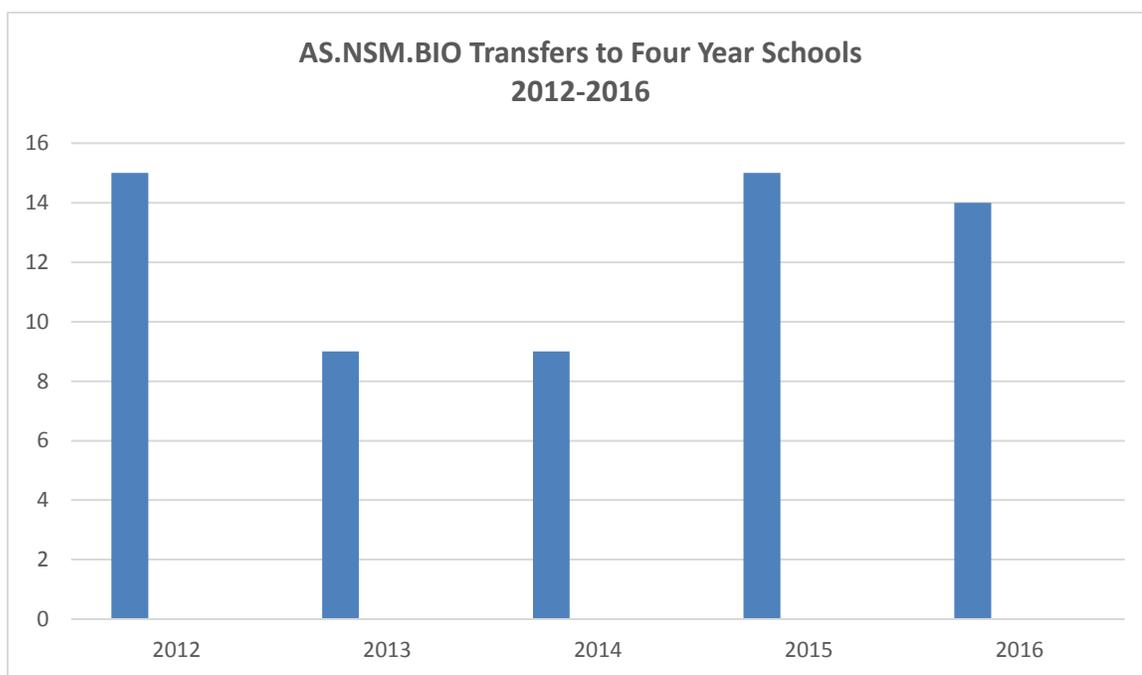
<http://bergen.edu/about-us/institutional-effectiveness/institutional-research/fact-books/>



Source: Bergen Community College Fact Books, 2012-2016.

**AS.NSM.BIO Transfers:** During this time period, 62 students transferred to a 4-year school, the large majority (16) transferred to Montclair State University (MSU). Other transfer schools on the list were William Paterson University (7), New Jersey Institute of Technology, NJIT (6), Ramapo College (6), CUNY Hunter College (4); Rutgers University Newark (4), Rutgers New Brunswick (4), and Seton Hall University (3). Data compiled from Bergen Community College Fact Books, 2012-2016.

When Race/Ethnicity was reviewed, it was found that 27.4% (17) Hispanic, all races and 27.4% (17) White transferred to 4-year schools. The majority, 38.7% (24), of students who transferred to 4-year schools were under 22 years old while 33.9% (21) of the students who transferred were between 22 and 24 years old. Only 25.8% (16) of the 25-34 years old group transferred to a 4-year school. When gender was reviewed, it was found that 61.3% (38) of female students transferred to a 4-year school, while only 38.7% (24) of male students transferred to a 4-year school. Data compiled from Bergen Community College Fact Books, 2012-2016. <http://bergen.edu/about-us/institutional-effectiveness/institutional-research/fact-books/>

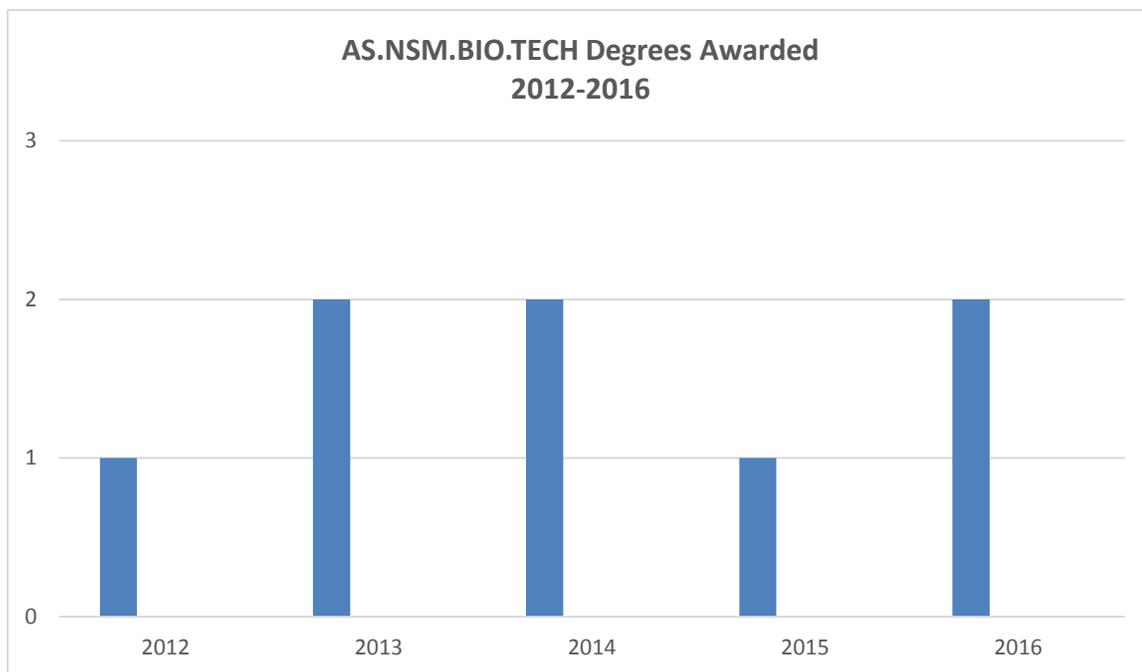


Source: Bergen Community College Fact Books, 2012-2016.

The above column graph shows only AS.NSM.BIO *graduates* that transfer- those students who fulfilled the requirements of the Biology Program for graduation from Bergen Community College. There are a great many students at BCC that describe themselves as Biology Majors in theory, but have not officially declared this to the college. Many of the students questioned are “*just taking the basics*” and have no intention of graduating from BCC. We would like to find out why this is so common.

Sixty two students (74%) of the Biology degree holders (n=84) from Bergen Community College transferred to four year schools. We would like to increase this number by making the transfer process seamless for our students.

**AS.NSM.BIO.TECH Graduates:** During the last five years there have been a total of eight students that received Biotech degrees from Bergen Community College. There is limited data regarding the graduates. Only one graduate responded to the survey. The limited amount of data may be due to the fact that the academic degree required for a majority of Biotechnology positions in the NY Metropolitan area is a Master's Degree (39, 52.7%). A smaller number of positions in the same regional area require a Bachelor's degree (28, 37.8%). The number of responses was 74 (100%). Data compiled from Bergen Community College Fact Books, 2012-2016.  
<http://bergen.edu/about-us/institutional-effectiveness/institutional-research/fact-books/>



Source: Bergen Community College Fact Books, 2012-2016.

**AS.NSM.BIO.TECH Transfers:** During this time period, only one student responded to the Graduate's Responses to the Graduate Transfer Experience Survey. This student transferred to Montclair State University (MSU). The student was very happy with the courses and the biotechnology experience at Bergen Community College. Only one student, in 2013, responded to the Graduate's Answers to Main Graduate Follow-up Survey. The student was full time and transferred to Kean University in Union, New Jersey. The student was happy with their experience at Bergen Community College and felt that the Biotech courses prepared them well for their future education. Data compiled from Bergen Community College Fact Books, 2012-2016.  
<http://bergen.edu/about-us/institutional-effectiveness/institutional-research/fact-books/>

## Student Support

The **Bridges to Baccalaureate (B2B)** is a grant funded by the National Science Foundation. It is a Grant with the goal to increase the number of minority STEM students (Spanish, Black,

American Indian, Native Hawaiian and South Pacific Islander) **transferring** from Bergen Community College to a 4 year College. <http://bergen.edu/b2b/>

Students have access to the following **Instructional Facilities and Services:**

(This information is available to students and faculty on the college website)

#**Assistive Technology Laboratory** provides training and access to computer programs to individuals with disabilities.

#**Developmental Math Center** offers tutorial Services for students enrolled in Developmental Mathematics Courses.

#**Online Writing Lab** is a Website designed to help students and faculty at all stages of the writing process.

#**Writing Center** provides tutoring for students that need assistance with their writing skills.

#The **Henry and Edith Cerullo Learning Assistance Center** provides resources for student tutoring.

#**STEM Center: Science Technology Engineering Mathematics Center** provides tutoring assistance to students in the science and mathematics areas.

#This information is taken from the Bergen Community College Website:  
<http://bergen.edu/current-students/student-support-services/>

### **Data Needs**

What additional data that is currently not available would have been helpful to effectively evaluate this area of the program?

We would like to obtain more student satisfaction information. We feel that more data of this type would allow us to make informed decisions that would directly affect our students and their success after attending or hopefully being graduated from Bergen Community College.

We would also like to obtain more data regarding the difference between the number of declared AS.NSM.BIO students and the number of students who graduate.

We would also like to find out why more students that *describe* themselves as Biology majors at BCC are not formally declaring themselves Biology majors.

## FOCUS ON FACULTY AND STAFF

Reflect on the faculty and staff in the program and the degree to which their needs are met, in order for them to in turn be successful with students. Comment on each of the following categories. Some considerations are given after each category—**please comment on only those which are applicable to this program.**

### Demographics

[Demographics of faculty and staff, full-time and part-time, faculty, technicians, support positions, ...]

The Department of Biology and Horticulture employs 14 full time faculty members (87.5%) in Biology and two full time faculty members (12.5%) in Horticulture. Depending on the semester, there are between 50 and 60 adjunct faculty in addition to the 16 full time faculty. Nine of our full time faculty (56%) have earned doctorates in biology or similar fields. Full time faculty members without doctorates have at least one master's degree in their teaching specialty. Adjunct faculty have at least a Master's degree in their teaching specialty; many have a doctorate in their teaching specialty. Ten of our faculty members are male (62.5%) while six of our faculty members are female (37.5%). Two of our most recent full time retirees (11.1%) were female (2/18 total). Depending on the semester, our adjunct faculty vary from 55% male/45% female to 65% male/35% female. Within the last five years, we have noticed that this adjunct rate fluctuates depending on the semester. Fifteen of our full time faculty members (93.8%) are White, one member (6.25%) is Hispanic, all races. One of our recent female retirees (5.5%) was Black/African American. Our adjunct faculty come from many different ethnic backgrounds. The ethnicity also varies depending on the semester.

The *minimum* academic credentials for instructors to teach our biology courses are 1) a Master's Degree in Biology or equivalent and 2) one year college level teaching experience OR equated experience as per Article XIV of the BCC-BCCFA Agreement.

The Department of Biology and Horticulture employs four full time and presently four part-time laboratory technicians. Of the four full time technicians, one technician (25%) has a Master's degree, two (50%) have a Bachelor's degree. Two of our full time laboratory technicians are female (50%) and two are male (50%). Three of our part-time laboratory technicians (75%) have a Bachelor's degree, one (25%) has an Associate's degree. All four of our part-time laboratory technicians (100%) are female. Three of our part-time laboratory technicians (75%) are Hispanic/all races and one (25%) is White.

The Department of Biology and Horticulture is supported by one department secretary, who also serves as the department secretary for the Physical Sciences and CSEIT/AVT, DFT, ELC, MFG and TEC.

## Professional Activities

[Special projects, reassigned time, professional organizations, grants, partnerships, publications, presentations, other contributions, ...]

The following list includes all full time Biology faculty members. The Horticulture faculty are included in the Horticulture Program Review Professional activities section.

**Dr. Robert Amitrano:** *Metropolitan Association of College and University Biologists (MACUB)*; with Dr. Tom Betsy, we are in the process of acquiring male and female synthetic cadavers, which will be utilized in our Anatomy and Physiology I and II laboratories. Author: Laboratory Exercises in Anatomy and Physiology with Cat Dissection 8E (Brooks/Cole/Cengage) and Anatomy and Physiology Lab Manual 7E (Brooks/Cole/Cengage) – both publications are used nationwide.

**Dr. Thomas Betsy:** Course Coordinator BIO-209 *Anatomy and Physiology II*. Past Advisor to the Environmental Club, First Chair of Bergen Community College Judicial Board, Author of two supplemental study guides by the McGraw-Hill company: *Microbiology Demystified* (co-author) and *Schaum's Outlines: Pathophysiology*. Member: MACUB, Also with Dr. Amitrano, we are in the process of acquiring male and female synthetic cadavers, which will be utilized in our Anatomy and Physiology I and II laboratories.

**Dr. Louis Crescitelli:** BIO-203 *Coordinator General Biology II*. MACUB; recent past member of the Bergen Community College General Education Committee;

**Dr. Barbara Davis:** *American Society for Clinical Pathology (ASCP)* and *American Society for Microbiology (ASM)*;

### **Bergen Community College** Presentations:

STEM C<sup>2</sup> Research Summit, *Science Literacy to Improve Science Education and Create Community Outreach Programs* Presented with Professor Flannery, Professor Lowe and Dr. Payne at **Bergen Community College** 4/11/14. Created online webpage for resources and references.

MACUB Conference *Meet the Expert: Student Outreach, Integrative Learning Experience at Bergen Community College* at BCC on 10/26/13. Written with and based on research with Professors Mary Flannery, Marty Lowe and Dr. Jeanie Payne.

**Davis, B.D.**, Flannery, M., Lowe, M. and Payne, J. 2014. American Society for Microbiology, Conference for Undergraduate Educators (ASMCUE), *How to Create Community Outreach Programs in Biology and Microbiology Education* presented with Professor Flannery, Professor Lowe and Dr. Payne in Danvers, MA on 5/16/14. Created online webpage for resources and references.

**Davis, B.D.**, Flannery, M., Payne, J, Lue, YA. *Meet the Expert, an Integrative Learning Experience for Microbiology and Anatomy and Physiology Undergraduate Students*. Poster Session. American Society for Microbiology (ASM) Annual Meeting, Denver, CO. May 2013.

**Davis, B.D.**, Flannery, M. and Payne, J, Lue, YA .A Webinar Case Study by a Clinical Microbiologist to Microbiology and Physiology.

**Davis, B.D.**, Flannery, M. and Payne, J, Lue, YA. Meet the Expert” – An Interactive Case Study in a Microbiology Undergraduate Education.

**Davis, B.D.**, Flannery, M., Payne, J, Lue, YA. *A Webinar Case Study by a Clinical Microbiologist to Microbiology and Physiology Students, An Integrative Learning Experience*. Poster Session, American Society for Microbiology Annual Meeting, New Orleans, LA. May 2011.

Classroom Using Video-Conferencing for Community Outreach to Microbiology.

#### **Journal Publications:**

**Davis, B.D.**, Flannery, M., Lowe, M. and Payne, J. 2014. Meet the Expert Interviews, An Integrative Learning Experience for Microbiology and Anatomy and Physiology Undergraduate Students. *Journal of Microbiology and Biology Education, Journal of Microbiology and Biology Education*, 15, 33-35.

**Davis, B.D.**, Flannery, M., and Payne, J. 2012. A Webinar Case Study by a Clinical Microbiologist to Microbiology and Physiology Students: An Integrative Learning Experience. *Journal of Microbiology and Biology Education*, 13, 91-93.

**Dr. Coleen Di Lauro:** Course Coordinator BIO-103 *The Human Body* and BIO-107 *Introduction to Human Biology*; Admissions Committee, BCC; Biology Club, General Education Committee, BCC.

The following work was presented at the 2016 **Bergen Community College** third annual **STEM C<sup>2</sup> Research Summit** on April 15, 2016:

**Coleen DiLauro** *Recognizing Brain Wave Patterns to Measure Degrees of Multiple Intelligences Using Howard Gardner's Theory and Biopac EEG Signal Acquisition Software via Bioelectric Recording Electrodes*. Students presenting were Sana Azizah Kahn, Jenny S. Rose, Jonathan Avila, Johnny Lazarte, Reshma Patel, and Alexa AVECILLAS.

**Coleen DiLauro** presented with student Alexander Thomas *Recognizing Patterns of Brain Waves*. Metropolitan Association of College and University Biologists meeting (MACUB) October 29, 2016, SUNY, Old Westbury, NY.

**Coleen DiLauro**, *EEG: Neural Resonant Induction Research with BioPac EEG Signals Acquisition Software via Bioelectric Recording Electrodes*. Students included Alexander Thomas, Sheron Mehak, Jenny Borisov, Elaina Chiurazzi, Heineken Daguplo, Nicolette Filipone, Nikita Gyawali, Yariel Henriquez, Mingoo Kim, Jonny Lazarte, Jose Lazarte, Frankin Okereke, Oscar Osore, Casandra Petrizzi, Marjorie Remington, Carmel Rafalowsky, Agatha Rodolfa, Daniel Rynerson, Mahtab Tazelarbadi, Randyl Torres, Erika Venegas, Jacqueline De Vries, and Michael Ansonoff.

**Professor Robert Dill:** Coordinator BIO-221 *Comparative Vertebrate Anatomy*, BIO-228 *Introduction to Marine Biology*, and BIO-229 *Tropical Marine Ecology*; Revised Lynn, L.M. *Environmental Biology and Ecology Laboratory Manual*, 6<sup>th</sup> Ed. Kendall/Hunt Publishers, Iowa 2016 ISBN 978-1465299444.

**Dr. Judith Fitzpatrick (Retired, 2016):** Director, Teen STEM Day, 2013, 2014, 2015; Institutional Review Board (IRB) member; Northeastern Organic Farming Association Annual Conference Jan 22- 24 2016; Developed the Soil Biometer™ Test, product was developed at Bergen Community College under a grant from the National Science Foundation (NSF). Provisional patent on the Soil Biometer™ was filed by the BCC Foundation in 2014. Delivered a workshop at the North

Jersey Division of the American Society for Quality Conference entitled, *QA, QC Strategies of Biological Systems* ©

**Professor Mary Flannery:** *American Association for the Advancement of Science (AAAS)*, MACUB, and Wildlife Conservation Society;

**Bergen Community College** Presentations:

**STEM C<sup>2</sup>** Research Summit, *Science Literacy to Improve Science Education and Create Community Outreach Programs* Presented with Professor **Mary Flannery**, Professor Lowe and Dr. Payne at **Bergen Community College** 4/11/14. Created online webpage for resources and references.

**MACUB Conference:** *Meet the Expert Student Outreach, Integrative Learning Experience at Bergen Community College* at BCC on 10/26/13. Written with and based on research with Professors **Mary Flannery**, Marty Lowe and Dr. Jeanie Payne.

Davis, B.D., **Flannery, M.**, Lowe, M. and Payne, J. 2014. American Society for Microbiology, Conference for Undergraduate Educators (ASMCUE), *How to Create Community Outreach Programs in Biology and Microbiology Education* presented with Professor Flannery, Professor Lowe and Dr. Payne in Danvers, MA on 5/16/14. Created online webpage for resources and references.

Davis, B.D., **Flannery, M.**, Payne, J, Lue, YA. *Meet the Expert, an Integrative Learning Experience for Microbiology and Anatomy and Physiology Undergraduate Students*. Poster Session. American Society for Microbiology (ASM) Annual Meeting, Denver, CO. May 2013.

Davis, B.D., **Flannery, M.** and Payne, J, Lue, YA .A Webinar Case Study by a Clinical Microbiologist to Microbiology and Physiology.

Davis, B.D., **Flannery, M.** and Payne, J, Lue, YA. "Meet the Expert" – An Interactive Case Study in a Microbiology Undergraduate Education.

Davis, B.D., **Flannery, M.**, Payne, J, Lue, YA. *A Webinar Case Study by a Clinical Microbiologist to Microbiology and Physiology Students, An Integrative Learning Experience*. Poster Session, American Society for Microbiology Annual Meeting, New Orleans, LA. May 2011.

#### **Journal Publications:**

Davis, B.D., **Flannery, M.**, Lowe, M. and Payne, J. 2014. "Meet the Expert Interviews," an Integrative Learning Experience for Microbiology and Anatomy and Physiology Undergraduate Students. *Journal of Microbiology and Biology Education, Journal of Microbiology and Biology Education*, 15, 33-35.

Davis, B.D., **Flannery, M.**, and Payne, J. 2012. A Webinar Case Study by a Clinical Microbiologist to Microbiology and Physiology Students: An Integrative Learning Experience. *Journal of Microbiology and Biology Education*, 13, 91-93.

**Professor Robert Highley:** Department of Biology and Horticulture Academic Department Chair (**ADC**), Coordinator BIO-101 *General Biology I*. Faculty Senate, BCC; Biology Website Manager, Title V grant participant, Author: *Exercises in General Biology I*, 3<sup>rd</sup> Ed. 7<sup>th</sup> Printing; *Microbiology Demystified*: Technical Advisor; AAAS, Sigma Xi, MACUB.

**Dr. Luis Jimenez:** Course Coordinator BIO-104 *Microbiology* and BIO-224 *Environmental Microbiology*. Library and Learning Resources Committee, BCC. **Bergen Molecular Ecology Group**

**BMEG, MACUB, ASM, AAAS, New Jersey Education Association (NJEA), Grant Support:-** Department of Education-STEM Graduation Path to Success (GPS) to Hispanic Serving Institutions (HIS)-National Science Foundation-Grant #0903168. Bridges to Baccalaureate Program. National Science Foundation. Adhoc Reviewer: Journal of Applied Microbiology, Journal of Industrial Microbiology, American Journal of Infection Control, PDA Journal of Pharmaceutical Sciences and Technology, Chemistry Today, International Journal of Microbiology, Letters in Applied Microbiology, World Journal of Microbiology and Biotechnology, EC Microbiology, BMC Microbiology.

#### **Bergen Community College Poster Presentations:**

Zapata, S., A. Gonzalez, M. Kulko, R. Kim, T. Jashari, A. Holwerda, T. Choe, and **L. Jimenez**. Direct PCR Detection, Cloning, and Characterization of Bacterial RubisCO Genes from New Jersey Soils. **STEM C<sup>2</sup> Research Summit Conference**, April 2017, **Bergen Community College** Paramus, New Jersey.

Bochis, J., M. Gardner, T. Jashari, V. Ellman, J. Vasquez, S. Zapata, V. Ramos, T. Choe, and **L. Jimenez**. Direct PCR Detection, Cloning, and Characterization of Mold Populations from Soils and Compost. **STEM C<sup>2</sup> Research Summit Conference**, April 2017, **Bergen Community College** Paramus, New Jersey.

Vasquez, J., T. Jashari, S. Zapata, J. Bochis, V. Ellman, M. Gardner, T. Choe, and **L. Jimenez**. Real Time PCR Detection of *Burkholderia cepacia* in Pharmaceutical Products Contaminated with a Mix Bacterial Culture. **STEM C<sup>2</sup> Research Summit Conference**, April 2017, **Bergen Community College** Paramus, New Jersey.

Gardner, M., J. Bochis, T. Jashari, V. Ellman, J. Vasquez, S. Zapata, V. Ramos, T. Choe, M. Tazehabadi and **L. Jimenez**. Comparison of DNA Barcoding Reference Sets for the Identification of Fungi in 3 Distinct ITS Region Clone Libraries. **STEM C<sup>2</sup> Research Summit Conference**, April 2017, **Bergen Community College** Paramus, New Jersey.

Tazehabadi, M., S. Peca, R. Ramadan, J. Bochis, J. Vazquez, S. Zapata, M. Gardner, and **L. Jimenez**. DNA Sequencing and Analysis of 16S rRNA and *mecA* Genes from *Staphylococcus aureus* Isolated from Suburban Human Subjects. **STEM C<sup>2</sup> Research Summit Conference**, April 2017, **Bergen Community College** Paramus, New Jersey.

Peca, S., R. Ramadan, J. Bochis, J. Vazquez, S. Zapata, M. Gardner, M. Tazehabadi, and **L. Jimenez**. Phenotypic and Genotypic Characterization of *Staphylococcus aureus* isolated from a Suburban Human Population. **STEM C<sup>2</sup> Research Summit Conference**, April 2017, **Bergen Community College** Paramus, New Jersey.

#### **Journal Publications:**

**Jimenez, L.**, I. Canal Delgado, E. Barron, S. Zapata, T. Jashari, T. Choe, and S. Melkonyan. 2015. Direct PCR detection, cloning, and characterization of bacterial  $\beta$ -glucosidase genes from temperate soils. *EC Microbiology* 2.2:261-268.

**Jimenez, L.**, E. Kulko, E. Barron, and T. Flannery. 2015. *Burkholderia cepacia*: A problem that does not go away. *EC Microbiology* 1.4:203-208.

**Jimenez, L.**, E. Kulko, E. Veloz, E. Barron, B. Ibrahim, T. Flannery, B. Margolies, P. Das, J. Mateo, and T. Aponte. 2015. 16S rRNA identification of microorganisms and direct detection of functional genes in waste material generated by an in-vessel rotating compost system. *EC Microbiology* 1.3:129-142.

**Jimenez, L.**, E. Kulko, and E. Barron. 2014. Molecular Characterization and Antimicrobial Susceptibility of *Staphylococcus aureus* isolates from a Healthy Student Population. *Journal of Microbiology and Experimentation* 1(5): 00030. DOI: 10.15406/jmen.2014.01.00030.

Ragheb, S.M., and **L. Jimenez**. 2014. Polymerase chain reaction/rapid methods are gaining a foothold in developing countries. *PDA Journal of Pharmaceutical Science and Technology* 68:239-255.

Singer, D., P. Noverini, M. Kaiser, **L. Jimenez**, T. Russel, P. Balachandran, and R. Jonquieres. 2013. Roundtable: 15 years in Pharmaceutical Microbiology. American Pharmaceutical Review. Posted October 30, 2013. <http://www.americanpharmaceuticalreview.com/Featured-Articles/148857-Roundtable-15-Years-in-Pharmaceutical-Microbiology/>

**Jimenez, L.** 2013. Métodos rápidos para el análisis microbiológico de productos farmacéuticos. Sección IV. Métodos de Control. Capítulo IV.11, páginas 428-447. En Manual de Microbiología aplicada a las Industrias Farmacéutica, Cosmética y de Productos Médicos. Héctor Cerra, María Cristina Fernández, Celina Horak, Mónica Lagomarsino, Graciela Torno, Esteban Zarankin (editores), Asociación Argentina de Microbiología, Buenos Aires, Argentina.

**Jimenez, Luis.** 2012. Optimisation de la production biopharmaceutique par le systeme BacT/ALERT 3D. Salles Propres 81:34-40.

**Jimenez, L.,** N. Rana, K. Travers, O. Santiago, J. Amalraj, and K. Walker. 2012. Rapid Quantitative Endotoxin Analysis of Biopharmaceutical Samples Using a Multi-Cartridge System. American Pharmaceutical Review 15, July/August: 45-63.

Sutton, S.W., and **L. Jimenez.** 2012. A Review of Reported Recalls Involving Microbiological Control 2004-2011 with Emphasis on FDA Considerations of "Objectionable Organisms". American Pharmaceutical Review 15, January/February: 42-57.

**Jimenez, L.,** N. Rana, J. Amalraj, K. Walker, and K. Travers. 2012. Validation of the BacT/ALERT® 3D System for Rapid Sterility Testing of Biopharmaceutical Samples. PDA Journal of Pharmaceutical Science and Technology 66:38-54.

**Professor Martha Lowe:** Past Course Coordinator *BIO-104 Microbiology*. Author, *Human Biology Laboratory Manual*, 2<sup>nd</sup> ed. revised printing, Kendall Hunt. Revised syllabus and class for Hybrid BIO-107 Introduction to Human Biology. MACUB;

**Bergen Community College** Presentations:

STEM C<sup>2</sup> Research Summit, *Science Literacy to Improve Science Education and Create Community Outreach Programs* Presented with Professor Mary Flannery, Professor **Marty Lowe** and Dr. Payne at **Bergen Community College** 4/11/14. Created online webpage for resources and references.

MACUB Conference *Meet the Expert Student Outreach, Integrative Learning Experience at **Bergen Community College*** at BCC on 10/26/13. Written with and based on research with Professors Mary Flannery, **Marty Lowe** and Dr. Jeanie Payne.

Davis, B.D., Flannery, M., **Lowe, M.** and Payne, J. 2014. American Society for Microbiology, Conference for Undergraduate Educators (ASMCUE), *How to Create Community Outreach Programs in Biology and Microbiology Education* presented with Professor Flannery, Dr. Davis, and Dr. Payne in Danvers, MA on 5/16/14. Created online webpage for resources and references.

Davis, B.D., Flannery, M., **Lowe, M.** and Payne, J. 2014. Meet the Expert Interviews, An Integrative Learning Experience for Microbiology and Anatomy and Physiology Undergraduate Students. Journal of Microbiology and Biology Education, *Journal of Microbiology and Biology Education*, 15, 33-35.

Davis, B.D., Flannery, M., **Lowe, M.** and Payne, J. 2014. "Meet the Expert Interviews," an Integrative Learning Experience for Microbiology and Anatomy and Physiology Undergraduate Students. Journal of Microbiology and Biology Education, *Journal of Microbiology and Biology Education*, 15, 33-35.

**Dr. Jeanie Payne (Retired, 2016):** Coauthor: *Microbiology Laboratory Manual* Kendall/Hunt Publishing Dubuque, Iowa. Past member of the BCC Representative Assembly; Awarded Professor Emeritus in 2017 at BCC; MACUB.

**Bergen Community College** Presentations:

**STEM C<sup>2</sup> Research Summit, *Science Literacy to Improve Science Education and Create Community Outreach Programs*** Presented with Professor Mary Flannery, Professor Lowe and **Dr. Jeanie Payne** at **Bergen Community College** 4/11/14. Created online webpage for resources and references.

**MACUB Conference, *Meet the Expert Student Outreach, Integrative Learning Experience at Bergen Community College*** at BCC on 10/26/13. Written with and based on research with Professors Mary Flannery, Marty Lowe and **Dr. Jeanie Payne**.

Davis, B.D., Flannery, M., Lowe, M. and **Payne, J.** 2014. American Society for Microbiology, Conference for Undergraduate Educators (ASMCUE), *How to Create Community Outreach Programs in Biology and Microbiology Education* presented with Professor Flannery, Professor Lowe and Dr. Payne in Danvers, MA on 5/16/14. Created online webpage for resources and references.

Davis, B.D., Flannery, M., Lowe, M. and **Payne, J.** 2014. Meet the Expert Interviews," An Integrative Learning Experience for Microbiology and Anatomy and Physiology Undergraduate Students. *Journal of Microbiology and Biology Education, Journal of Microbiology and Biology Education*, 15, 33-35.

Davis, B.D., Flannery, M., **Payne, J.**, Lue, YA. *Meet the Expert, an Integrative Learning Experience for Microbiology and Anatomy and Physiology Undergraduate Students.* Poster Session. American Society for Microbiology (ASM) Annual Meeting, Denver, CO. May 2013.

Davis, B.D., Flannery, M., and **Payne, J.** 2012. A Webinar Case Study by a Clinical Microbiologist to Microbiology and Physiology Students: An Integrative Learning Experience. *Journal of Microbiology and Biology Education*, 13, 91-93.

Davis, B.D., Flannery, M. and **Payne, J.**, Lue, YA. Meet the Expert – An Interactive Case Study in a Microbiology Undergraduate Education.

Davis, B.D., Flannery, M., **Payne, J.**, Lue, YA. *A Webinar Case Study by a Clinical Microbiologist to Microbiology and Physiology Students, An Integrative Learning Experience.* Poster Session, American Society for Microbiology Annual Meeting, New Orleans, LA. May 2011.

**Professor John Smalley:** Coordinator BIO-210 *Introduction to Biotechnology*, BIO-211 *Introduction to Bioinformatics*, and BIO-222 *Embryology*. Faculty Senate, BCC; MACUB, Creator and co-founder (along with Dr. Luis Jimenez and Dr. Elena Tartaglia) of the **Bergen Molecular Ecology Group (BMEG)** April 2015. Recipient of Faculty Research/Scholarship Release Time Award for a project entitled: "A Molecular Assessment of Local Biodiversity Employing Collection and Analysis of DNA (eDNA)" 2013-2015. American Society of Naturalists; AAAS; Native Plant Society of New Jersey; Sigma Xi; The Society for the Study of Evolution; American Society of Ichthyologists and Herpetologists (ASIH); Microscopy Society of America;

**Bergen Community College** Lecture Presentations:

Presented a lecture entitled: "Frass: The Next Generation - A Molecular Characterization of the Gut Microbiome of Luna Moth *Actias luna* Caterpillars Using Next Generation Sequencing" **STEM C2 Research Summit**, April 15, 2016, **Bergen Community College**.

Presented a lecture entitled: "You Don't Know Frass About Luna Moths!: A Molecular Investigation of the Gut Microbiome of the Luna Moth Caterpillar" **STEM C2 Research Summit**, April 17, 2015, **Bergen Community College**.

Presented a lecture entitled: "Look Up, Look Down, Look All Around...DNA: An Overview Of Environmental DNA (eDNA) Analysis." **STEM C2 Research Summit**, April 11, 2014, **Bergen Community College**.

### **Poster Presentations:**

Bacterial Communities in Luna Moth *Actias luna* Caterpillar Fecal Samples (Faculty Advisor). 7th Annual Garden State-LSAMP/Northern New Jersey **Bridge to Baccalaureate B2B/STEM Research Conference**, October 19, 2015, Rutgers University New Brunswick, New Jersey

Comparison of Bacterial Communities in Caterpillar Fecal Material, Compost, and Soil Using Next Generation Sequencing (Faculty Advisor). 48th Annual Fall **MACUB** Conference, November 7, 2015, Montclair State University, Montclair, NJ

Bacterial Communities in Luna Moth (*Actias luna*) Caterpillar Fecal Samples (Faculty Advisor). 48th Annual Fall **MACUB** Conference, November 7, 2015, Montclair State University, Montclair, NJ

Assessment of Turtlegrass (*Thalassia testudinum*) Population Genetics in an UNESCO Biosphere Reserve. American Society of Plant Biologists Annual Scientific Meeting, July 12-16, 2014, Oregon Convention Center, Portland, OR

Preliminary Microsatellite Analysis Suggests that *Thalassia testudinum* in Separated Bays of St. John Virgin Island May Have Greater Genetic Diversity than Previously Believed. 46th Annual Fall **MACUB** Conference, October 26, 2013, **Bergen Community College**, Paramus, NJ

Auxin Conjugate Hydrolases of Two Gymnosperms and Evolutionary Implications. 46th Annual Fall **MACUB** Conference, October 26, 2013, **Bergen Community College**, Paramus, NJ

An enzymatic analysis of Loblolly pine and Sitka Spruce auxin conjugate hydrolases and evolutionary implications. Plant Growth Regulation Society of America Annual Meeting, July 28-August 1, 2013, Renaissance Orlando at SeaWorld, Orlando, FL

A phylogenetic examination of the primary anthocyanin production pathway in plants. American Society of Plant Biologists Annual Meeting, July 20-24, 2012, Austin Convention Center, Austin, TX

### **Journal Publications:**

Campanella, James J., Bologna, Paul A. X., Carvalho, Maria, **Smalley, John V.**, Elakhrass, Mohammedhakim, Meredith, Robert W., and Zaben, Nadia. Clonal Diversity and Connectedness of Turtle Grass *Thalassia testudinum* Populations in a UNESCO Biosphere Reserve. *Aquatic Botany*. 123:76-82, 2015.

Campanella, James J., Zaben, Nadia, Enriquez, Dalma, **Smalley, John V.**, Ludwig-Müller, Jutta. An Enzymatic Analysis of Loblolly Pine and Sitka Spruce Auxin Conjugate Hydrolases and Evolutionary Implications. *Acta Horticulturae*, 1042:79-88, 2014.

Campanella, James J., **Smalley, John V.**, Dempsey, Maureen. A Phylogenetic Examination of the Primary Anthocyanin Production Pathway of the Plantae. *Botanical Studies*, 55:10,

Campanella, J. J., Bologna, P. A., **Smalley, J. V.**, Avila, D. N., Lee, K. N., Areche, E. C., & Slavin, L. J. (2013). An analysis of the population genetics of restored *Zostera marina* plantings in Barnegat Bay, New Jersey. *Population Ecology*, 55(1), 121-133.

**Dr. Charles Sontag:** Course Coordinator BIO-108 *Introduction to Environmental Biology* and BIO-227 *Principles of Ecology*. Curriculum Committee, BCC. Les Lynn, Rob Dill, and I revised the lab text for Environmental Biology. MACUB attendance with poster: *Comparison of Water from Five Reservoirs in Bergen County*. Colombo, Kate, Godfrey, Cormac, and **Charles Sontag**. Animal Behavior Society. ABS Education Committee and attended National Meeting in Columbia Missouri. NJ Association of Railroad Passengers. Project: Identification of disused rail lines for preservation and reuse as commuter rail. Environmental Club adviser; NJ Bike Walk Coalition member and Annual Meeting Attendee.

**STEM** summer project adviser: Water Chemistry along the Hackensack River.  
**STEM C<sup>2</sup>** attendee and student Katelyn presented her Water Chemistry Project.

**Dr. Elena Tartaglia:** Course Coordinator BIO-225 *Invertebrate Zoology*. Learning Assessment Committee, BCC, BMEG.

#### **Bergen Community College** Lecture Presentations:

Jacqueline Mateo, Katelyn M. Nunberg, Marie Manzan, **Project Advisor: Dr. Elena Tartaglia**. Richness and abundance of beneficial insects on native and horticultural plantings at **Bergen Community College's Paramus Campus**. Poster presentation at 47<sup>th</sup> annual Metropolitan Association of College and University Biologists Conference (MACUB), 1 November 2014 at Molloy College Rockville Center, NY.

Katelyn M. Nunberg, Josephine Maresca, Stephanie Zapata, **Project Advisor: Dr. Elena Tartaglia**. A two-year study of richness and abundance of beneficial insects on native and horticultural plantings at **Bergen Community College's Paramus Campus**. Poster presentation at 48<sup>th</sup> annual Metropolitan Association of College and University Biologists Conference, 7 November 2015 at Montclair State University, Montclair NJ.

Vincent Chisvette, Subin You, Isaac I. Alejo Reyes, **Project Advisor: Dr. Elena Tartaglia**. An assessment of water quality and aquatic macroinvertebrate diversity of stream communities of the Passaic and Saddle River watersheds in Bergen County, NJ. Poster presentation at 48<sup>th</sup> annual Metropolitan Association of College and University Biologists Conference (MACUB), 7 November 2015 at Montclair State University, Montclair NJ.

#### **Journal Publications:**

**Tartaglia ES** and SN Handel. 2015. Nectar plant preferences of *Hemaris* (Sphingidae) on co-occurring native *Cirsium* and non-native *Centaurea* inflorescences. *Journal of Pollination Ecology* 13: 184 – 187.

**Tartaglia, ES**, Aronson MJ, Raphael, J. (*In review*). How does suburban horticulture influence plant invasions in a remnant natural area within a newly recognized biodiversity hotspot?

**Professor Gerard Tortora:** Course Coordinator BIO-109 *Anatomy and Physiology I*. He is the senior author of *Principles of Anatomy and Physiology* (14/e, Wiley)) and *Microbiology* (10/e, Pearson). Both texts are used at BCC as well as nation-wide and internationally. Both books are best-sellers in their respective areas. The books are used by our allied-health students to successfully complete their biology course requirements and to prepare them for the specialized courses in their respective programs.

## **Adjunct Faculty**

[Hiring, coordination, support, communication, ...]

There are between 50 and 60 adjunct faculty members that teach in our department. The number fluctuates depending on the enrollment and the needs of the department, division, and the college. In the past, the number has reached 65 adjunct faculty. Figures are compiled from Department Section Availability Reports, 2012-2016. The hiring of adjunct faculty is the responsibility of the Academic Department Chair (ADC) of the Department of Biology and Horticulture with the assistance of Human Resources and the department secretary. We inform possible adjuncts of employment opportunities by advertising locally and on the college website. As of late, we have been hiring more adjunct faculty due to the retirement and non-replacement of full time faculty members. (We have also been hiring more adjunct faculty due to the elimination of our full time non tenure track faculty members known as lecturers. At one point, several years ago, we employed seven lecturers.) All adjunct faculty have advanced degrees (Master's and higher) in their teaching specialty. This has been a requirement of the department and will continue to be so in the future. Support for the adjunct faculty is provided by the department chair, course coordinators, and the department secretary. Communication is maintained through postal mail, email, department office visits, course coordinators, and through the evening office and the department secretary.

## **Staff**

[Secretarial/clerical support, other staff support, ...]

We have one full time department secretary who handles the secretarial, clerical, and support responsibilities. This support includes assistance with the budget and faculty evaluations. We share this person with the Department of Physical Sciences. Bergen Community College needs to develop a plan to provide coverage in case of the absence of our department secretary.

As previously mentioned, we employ eight laboratory technicians: four full time and four part-time technicians. Six of the eight technicians work in the Pitkin Education Building and one, a full time technician, works in the Horticulture area in Ender Hall. One part-time laboratory technician works in the Biology facility on the fifth floor of the Lyndhurst Campus.

Full time technicians work a regular 35 hour week, while our part-time technicians are limited to only 19.5 hours per week. Each laboratory technician has his/her duties that result in the support of the faculty and the students during the laboratory sessions. One full time laboratory technician handles the microbiology responsibilities for the department and works mainly between 3:00 p. m. – 10:30 p. m. This person also supervises the use of the autoclaves and the training required for their use. All our technicians are required to undergo 15 hours of autoclave training before they are certified to use the machines without supervision. In addition, he handles the majority of the ordering of the microbiology supplies and assists the part time technicians with their duties. Another full time technician, in addition to her laboratory prep duties, obtains quotes for materials and equipment and handles almost all of the ordering for the department. She also works closely with Dean P.J. Ricatto on expense and cash flow control and plan versus actual analysis in addition to working with Purchasing and Accounts Payable on problem solving. The third full time technician handles general lab responsibilities on the third floor, assists with lab responsibilities on the second floor, and supervises the part-time technicians. She assists with

the scheduling of their hours and lab locations. She also assists with the purchasing of the biology materials, supplies, and equipment. The fourth full time technician is employed solely in the Horticulture area and handles many and various responsibilities in that location.

All of our laboratory technicians also provide various types of support, during and in between scheduled laboratory sessions, to our adjunct faculty.

The Technical staff is accessible to faculty and the department secretary through the recently implemented telephone System. This system allows for communication between lab technicians, faculty and staff on the second and third floors of the Pitkin Education Building in addition to communication from anywhere else in the building. The system also provides contact with the Lyndhurst Campus prep room. The system is accessible from outside the building or off campus. The laboratory telephone extension is 3755. This extension is on all phones anywhere there is a technical office or storage area. All laboratory technicians (both full and part time) are expected to follow the lab protocol established by the Biology Department (See **Appendix 2** for a list of lab tech responsibilities.)

### **Data Needs**

What additional data that is currently not available would have been helpful to effectively evaluate this area of the program?

We would like to obtain data that would help us to plan for unforeseen absences of our department secretary. This plan would allow us to maintain the daily functions of the department.

## FOCUS ON CURRICULUM

Reflect on the curriculum for the program—the courses, the scope and sequence, articulation with other institutions, teaching innovations, and other relevant issues—**please comment on only those which are applicable to this program.**

### Summary of Program Curriculum

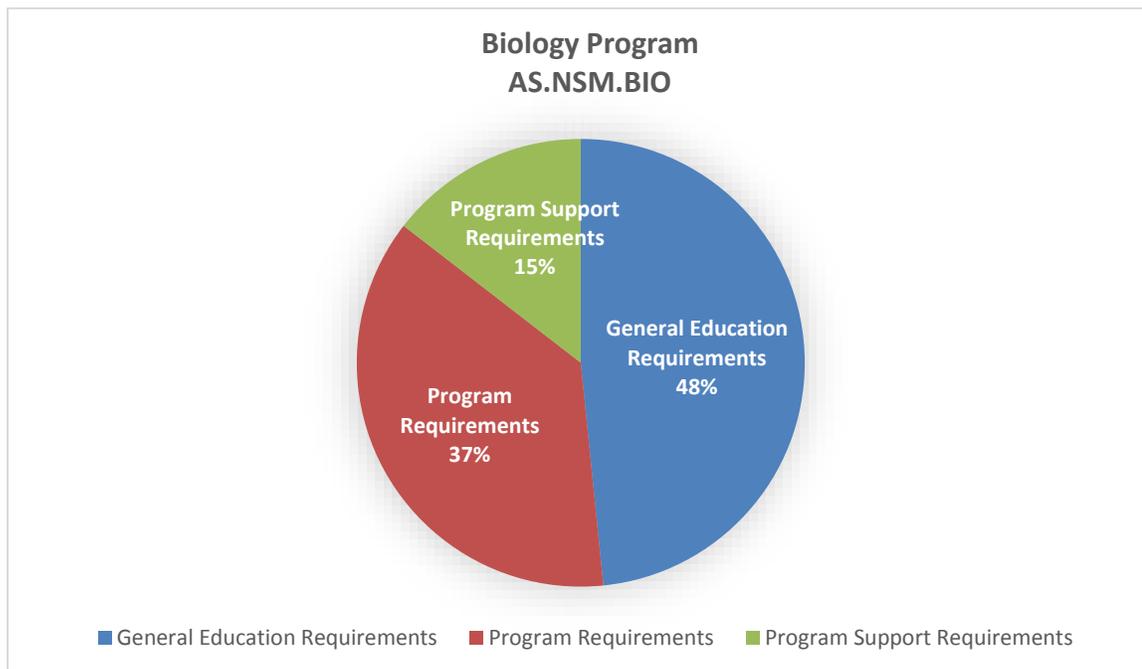
[Degrees, certificates, sequences of courses] Attach copies of Program Learning Outcomes, Curriculum Maps and Master Course Syllabi, where applicable

Please see pages 37-41 for the 2014-2016 Biology Assessment Report and pages 47-52 for the AS.NSM.BIO and AS.NSM.BIO.TECH Curriculum Maps.

Our current Biology option (**AS.NSM.BIO**) grew out of the original *Liberal Arts and Science Degree* that was established when Bergen Community College was chartered in the 1960s. The phrase *Science Major* was one of several variations of that original degree. There was no Biology “major” at this time. This degree was modified and renamed *Associate in Science Degree (A. S.)* with a *Concentration in Biology* in 1970. This new A. S. degree was in effect until the fall of 1984, when the phrase *Concentration in Biology* was replaced with *Biology Option*. It was also at this time that the Biology Option code and numerical designation were established (Code 212). This was the framework for our Biology option until the spring of 2010 when two major changes to the option were approved: 1) *General Chemistry I* (CHM-140) and *General Chemistry I lab* (CHM-141) and *General Chemistry II* (CHM-240) and *General Chemistry II lab* (CHM-241) were returned to the Biology option as requirements and not just recommendations and 2) the biology students were given the option of taking *Calculus I* (MAT-280) or *Statistics* (MAT-150) in addition to the required Precalculus (MAT-180) course. The actual degrees or options including the current Biology option (AS.NSM.BIO) are shown at the end of this section. Information taken from the Bergen Community College Catalogs 1968-2015.

**AS.NSM.BIO:** Our Biology program is a transfer program that requires students to complete 65 or 66 credits. Thirty credits of the 65 or 66 total are **General Education Requirements:** nine credits in Communication, six credits in Humanities, three credits in Social Science, and 12 credits in Mathematics, Natural Sciences, and Technology. 22 – 24 credits are required as restricted **Program Requirements**, nine are **Program Support Requirements**, which include six additional credits in Humanities and three in Social Science, and three are Free Elective credits. Students are required to take *General Biology I and II* (BIO-101 and BIO-203), *General Chemistry I and II* (CHM-140 and 240) and labs (CHM 141 and 241), *Precalculus* (MAT-180) and either *Calculus I* (MAT 280) or *Statistics* (MAT-150), and two Biology Electives. Students can choose from the following biology electives: BIO-221 *Comparative Anatomy*, BIO-222 *Embryology*, BIO-224 *Environmental Microbiology*, BIO-225 *Invertebrate Zoology*, BIO-227 *Principles of Ecology*, BIO-228 *Introduction to Marine Biology*, or BIO-229 *Tropical Marine Ecology*. Information taken from the BCC Smart Catalog <http://bergen.smartcatalogiq.com/en/2016-2017/Catalog/Academic-Programs/AS-Degree-Programs-in-Natural-Sciences-or-Mathematics/Natural-Sciences-or-Mathematics-AS-Biology-Option>

Please see pages 42 and 43 for the **AS.NSM.BIO** Biology Program Semester by Semester framework.



Source: BCC catalog 2014-2015.

**AS.NSM.BIOTECH:** Our Biotechnology program is a transfer program that requires students to complete 64 credits. Thirty credits of the 64 total are **General Education Requirements:** Nine credits in Communication, six in Humanities, three in Social Science, 12 in Mathematics, Natural Sciences, and Technology. Twenty three credits are required as **Program Requirements** and nine are **Program Support Requirements**, and three are Free Elective credits. Students are required to take *General Biology I and II* (BIO-101 and BIO-203), *General Chemistry I and II* (CHM-140 and 240) and labs (CHM-141 and 241), *Elementary Statistics* (MAT-150), *Precalculus* (MAT-180), and *Calculus I* (MAT-280) and two Biotechnology courses: BIO-210 *Introduction to Biotechnology* and BIO-211 *Introduction to Bioinformatics*. Information taken from the BCC Smart Catalog <http://bergen.smartcatalogiq.com/en/2016-2017/Catalog/Academic-Programs/AS-Degree-Programs-in-Natural-Sciences-or-Mathematics/Natural-Sciences-or-Mathematics-AS-Biology-Option>

Please see pages 43 and 44 for the **AS.NSM.BIO.TECH** Biotechnology Program Semester by Semester framework.

### Curricular Issues

[Articulation, program development, course development]

The current Biology Program is the result of the school-wide program modification process that began in 2008. The chemistry and mathematics modifications to the Biology program were made

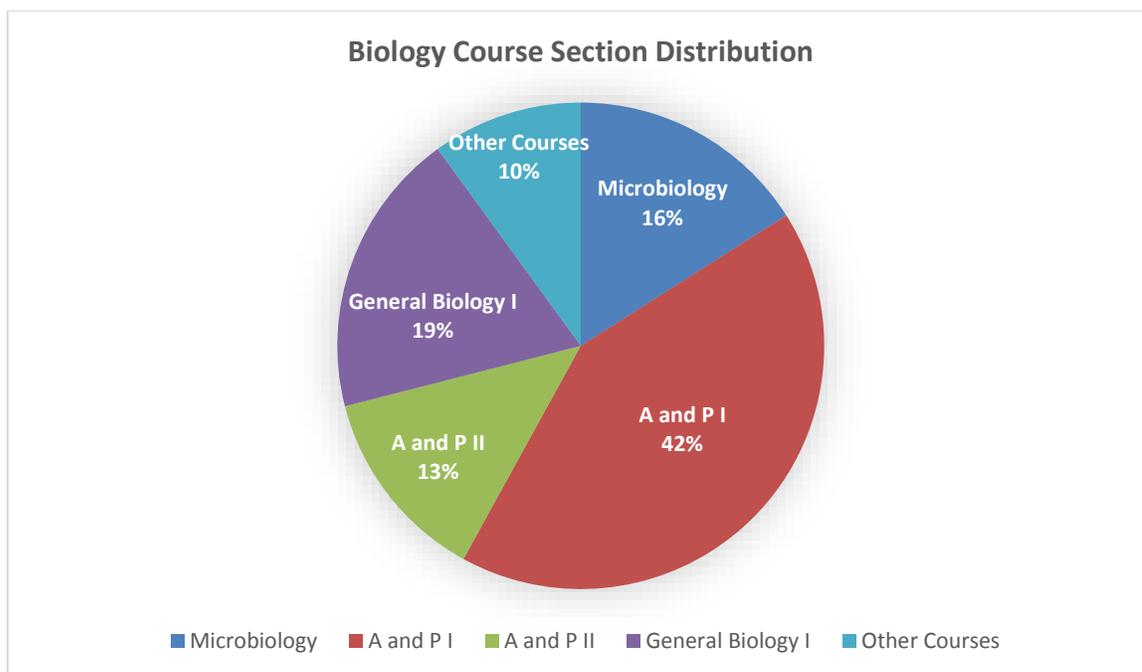
in 2010. The modifications were the addition of *General Chemistry I and II* (CHM-140 and 240) and labs (CHM-141 and 241) and the choice of *Elementary Statistics* (MAT-150) or *Calculus I* (MAT-280) to supplement the already required *Precalculus* (MAT-180).

In 2014, our Biology electives were renumbered to reflect the prerequisite of BIO-203 General Biology II for each of them. The course numbers were chosen to follow BIO-203 *General Biology II: Comparative Anatomy* became BIO-221, *Embryology* became BIO-222, and *Environmental Microbiology* became BIO-224. In 2016, *Comparative Anatomy* was change to *Comparative Vertebrate Anatomy* to reflect the actual content of the course; the course number, BIO-222, was kept the same.

In 2014, the department began to review our course descriptions for accuracy and content. This led to the rewriting of the BIO-101 *General Biology I* course description.

In 2013, we removed two *Vertebrate Anatomy and Physiology* courses (BIO-115 and BIO-215) from the biology course list and placed them in the Veterinary Technology course list. The courses became VET-115 and VET-215.

In 2011, we added BIO-225 *Invertebrate Zoology* to the list of Biology electives that biology students can take to fulfil their program requirements.

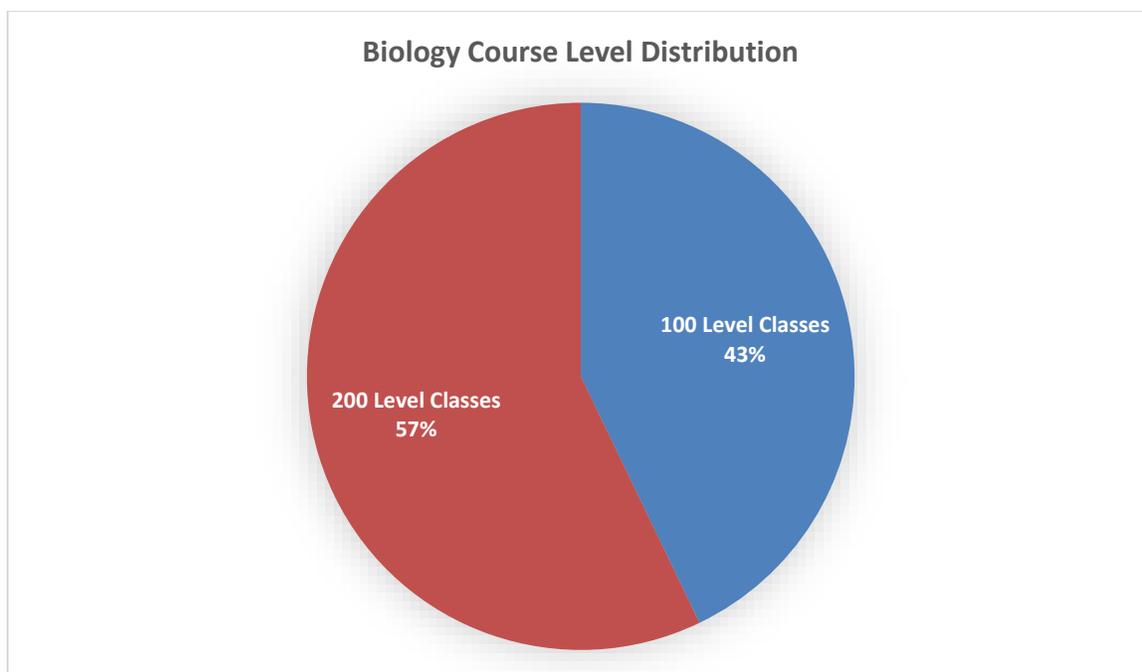


**Source:** Department Section Availability Reports, 2012-2016.

The above chart shows the five year average (2012 – 2016) for the four most popular courses offered by the department. The largest percent (42%) is BIO-109 *Anatomy and Physiology I*. The values are for the fall and spring semesters only.

BIO-109 *Anatomy and Physiology I* and BIO-209 *Anatomy and Physiology II* are prerequisite courses to prepare students for careers in the following health professions: Nursing, Diagnostic Medical Sonography, Radiography, Dental Hygiene, Surgical Technology, Respiratory Therapy, Medical Assistant Programs, Veterinary Technology, Clinical Laboratory Sciences, Massage Therapy, Mortuary Science, Paramedic Science, Emergency Medical Services, Occupational Therapy, Speech Therapy, Registered Dietitian, Optometry, Physician's Assistant, Physical Therapy, Medicine, Dentistry, Veterinary Medicine, Chiropractic, Podiatry and Biomechanical Engineering.

There is currently no form of **independent study** credit available for students who wish to obtain credits for scholarly class work outside of formal classes. Independent Study is a mode of scientific instruction in which a student completes an assignment outside of a traditional classroom environment. During the last several years, we have reviewed this need and would like to develop a policy that would allow students to obtain these credits.



Source: BCC catalog 2014-2015.

The department offers a total of 21 Biology courses (courses designated BIO). We currently offer nine 100 level courses (43%) and 12 200 level courses (57%). We have been evaluating the need for several additional 100 level courses. Source: BCC Smart Catalog <http://bergen.smartcatalogiq.com/en/2016-2017/Catalog/Academic-Programs/AS-Degree-Programs-in-Natural-Sciences-or-Mathematics/Natural-Sciences-or-Mathematics-AS-Biology-Option>

Please see pages 44-47 for a complete list of our Biology courses and their course descriptions.

## Lead-in Courses

[Developmental preparation, prior courses and their impact, alignment with AGECE or with Course Equivalency Guide, dual enrollment or articulation agreements with high schools, ...]

To complete a Biology degree, students are required to complete two **Chemistry courses**. They are *General Chemistry I* and *II* (CHM 140 and 240) and labs (CHM-141 and 241). To register for *General Chemistry I* and *II* (CHM 140 and 240) and labs (CHM-141 and 241), students must complete (or show competency in) CHM 100 *Introduction to Chemistry*, which requires that students complete (or show competency in) MAT-048. All students are expected to complete (or show competency in) MAT-011 *Basic Mathematics*.

In addition to the chemistry courses required to complete a Biology degree, students are also required to complete two or three **Mathematics courses**. They are *Precalculus* (MAT-180) and either *Calculus I* (MAT 280) or *Statistics* (MAT-150). These courses also have prerequisites: MAT-048 *Algebra* and/or MAT-160 *Intermediate Algebra*. All students are expected to complete (or show competency in) MAT-011 *Basic Mathematics*. Source: <http://bergen.edu/academics/academic-divisions-departments/biology-horticulture/biology/>.

We allow students to receive 8.0 college credits for **Advanced Placement (AP)** Biology courses taken in secondary schools, if they have scored a 3, 4, or 5 on the AP exam for those specific courses. Upon completion of their AP courses and exams, they can start by taking our 200 level Biology electives. Source: <http://bergen.edu/academics/academic-divisions-departments/esl-world-languages/world-languages-and-cultures/credit-by-exam-advanced-placement-ap/>.

We have **Dual Enrollment Articulation** agreements with the following Bergen County secondary schools: Academies at Englewood, BCTS-Teterboro, Becton Regional, Bergenfield, Garfield, Ramapo-Indian Hills, Ridgewood, and Riverdell schools. The courses taken at these schools will allow students to begin our second level courses when they enroll at BCC. Information provided by the Office of Dual Enrollment and <http://bergen.edu/academics/college-high-school-partnership-programs/dual-enrollment/>

## Follow-up Courses

[Sequential courses, connecting activities, ...]

We have two pairs of sequential courses: *General Biology I* and *General Biology II* (BIO-101 and 203) and *Anatomy and Physiology I* and *Anatomy and Physiology II* (BIO-109 and 209). BIO-109 and 209 are required courses for all of the health professions programs (majors) at BCC. Students planning to move from BIO-109 into BIO-209 must earn a grade of C or better in BIO-109 before being allowed to register for BIO-209. There is no requirement of this type for students moving from BIO-101 into BIO-203.

## Health Professions Majors offered at Bergen Community College

After successfully completing BIO-109 *Anatomy and Physiology I* and BIO-209 *Anatomy and Physiology II*, prospective health career students have the option of enrolling in the following career programs:

Dental Hygiene  
Medical Office Assistant  
Paramedic Science  
Radiation Therapy Technology  
Surgical Technology

Diagnostic Medical Sonography  
Nursing  
Radiography  
Respiratory Therapy  
Veterinary Technology

Source: BCC Smart catalog <http://bergen.smartcatalogiq.com/en/2016-2017/Catalog/Academic-Programs/AS-Degree-Programs-in-Natural-Sciences-or-Mathematics/Natural-Sciences-or-Mathematics-AS-Biology-Option>

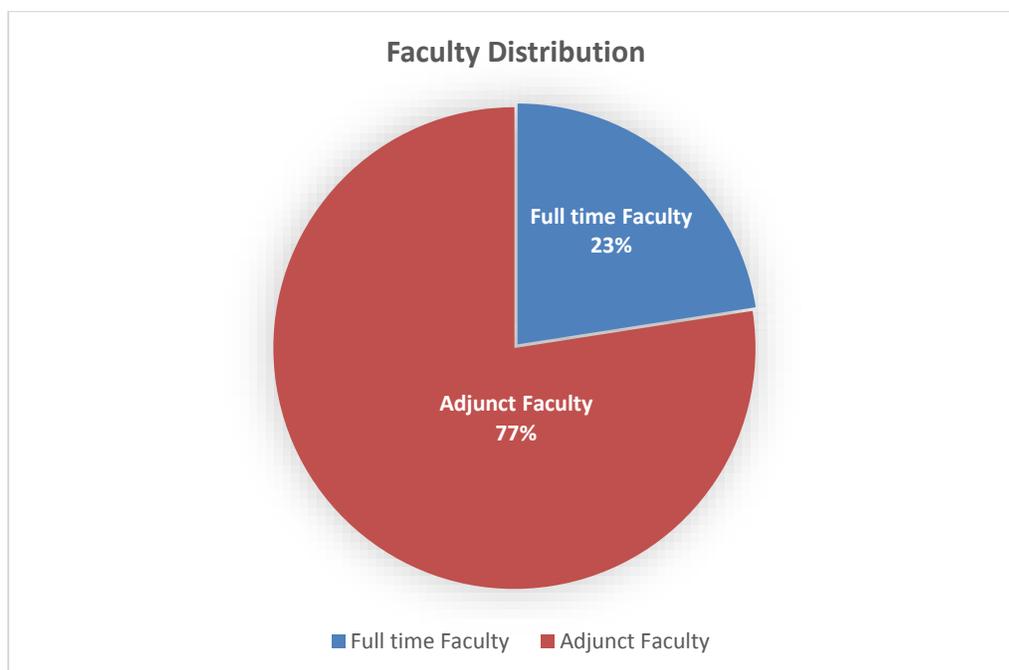
Some students may have already been accepted into one of the above programs and will take BIO-109 *Anatomy and Physiology I* and BIO-209 *Anatomy and Physiology II* during their program period.

BIO-101 *General Biology I* and BIO-203 *General Biology II* are the prerequisites for our Biology Electives: BIO-221 *Comparative Vertebrate Anatomy*, BIO-222 *Embryology*, BIO-224 *Environmental Microbiology*, BIO-225 *Invertebrate Zoology*, BIO-227 *Principles of Ecology*, BIO-228 *Introduction to Marine Biology*, and BIO-229 *Tropical Marine Ecology*.

### Scheduling

[Enrollment patterns and trends; time and date issues such as day, afternoon, evening, or weekend, format issues such as self-paced, distance, or short-term; ...]

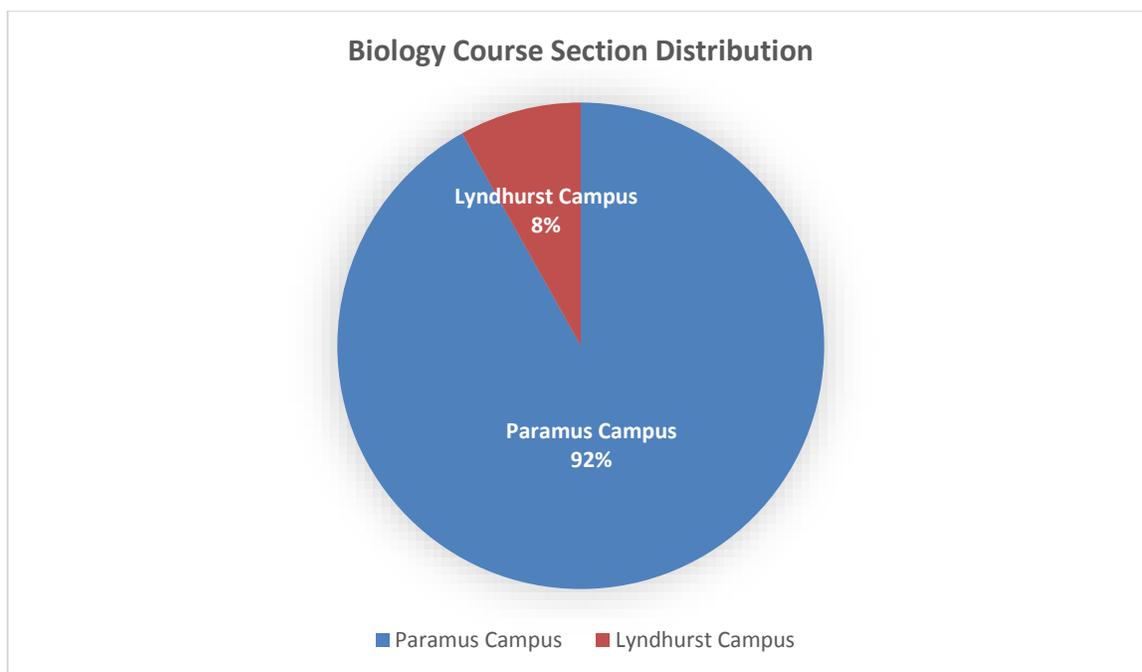
We began the five year period with eighteen full time faculty members. Two full time faculty members have recently retired leaving us with 16 full time faculty members, 14 of which teach our biology courses. To cover our annual class schedules, we have employed an average of 17 (23%) full time faculty and approximately 55 adjunct faculty (77%). The number of adjuncts varies depending on the year and semester.



Source: Department Section Availability Reports, 2012-2016.

We would like to fill the two full time faculty positions with new faculty, but as of this report we have not been given permission by the administration to do this.

The department offers sections of Biology courses on two campuses: Paramus and Lyndhurst. The majority of sections 92% (136) are offered on the Paramus Campus and 8% (12) are offered on the Lyndhurst Campus. These numbers were averages for the spring and fall of 2016. The numbers for previous semesters are similar these, although we have been slowly increasing the number of sections in Lyndhurst. The slow increase reflects the overall need based on the enrollment trend on the Lyndhurst campus.



**Source:** Department Section Availability Reports, 2012-2016.

Currently, there are no biology courses offered on the Hackensack Campus.

The department offers sections of biology courses from 8:00 a. m. to 10:20 p. m. five days a week (M-F) on both campuses and from 8:00 a. m. – 2:00 p. m. on Saturdays in Paramus. We offer three types of classes: on-campus (traditional, both lab and lecture on campus) sections, hybrid (lecture online and lab on campus) sections, and completely online sections. The majority of our sections are on-campus sections while several sections are hybrid sections and two sections each semester are completely online. The two online sections are BIO-107 *Introduction to Human Biology* sections. We offer sections of virtually all general education biology courses in the fall, spring and summer sessions. Information from Department Section Availability Reports, 2012-2016.

At this time, all our biology electives are offered during the day Monday through Friday. We are currently looking at ways to offer biology electives at night and maybe on Saturdays. This would allow evening students who would like to earn a Biology degree at BCC to complete their degree

with the required electives. We are also looking into the possibility of biology electives being offered on weekends for students who cannot attend during the day or in the evening Monday through Friday. Students have asked and we would like students to be able to obtain a Biology degree on Saturdays. We will begin looking into this possibility in the fall of 2017 or the spring of 2018.

Our **Biology electives**, BIO-222 *Embryology* and BIO-227 *Principles of Ecology* are offered only in the fall of the academic year, while BIO-221 *Comparative Vertebrate Anatomy* and 225 *Invertebrate Zoology* are offered only in the spring of the academic year. BIO-224 *Environmental Microbiology*, since its introduction, is offered in both the fall and spring semesters. BIO-228 *Introduction to Marine Biology* is offered during the summer session. BIO-210 *Introduction to Biotechnology* and BIO-211 *Introduction to Bioinformatics* are usually offered in the fall and spring respectively. Information from Department Section Availability Reports, 2012-2016.

The majority of our sections commence at the beginning of the fall and spring semesters, usually the day “school opens”. These sections meet for 15 weeks and are known as *semester I* sections. We also offer sections of courses that start after the beginning of the fall or spring semester, these are known as *semester II* sections (usually meet for 12 weeks) and if the need arises, we offer half semester sections known as *semester III* sections that meet for seven and a half weeks. Recently, we have started offering **Weekend College** sections that meet on Saturday and Sunday for a predetermined number of weeks. This fall, BIO-130 *People Plant Relationships* will meet for six weekends with additional work completed online. Two of our summer sessions, Summer I and Summer II, are five and a half weeks long. Our long summer session, Summer SU, runs for eleven weeks, beginning at the same time as Summer I and ending at the same time as Summer II. We offer biology sections during the day and in the evening in all three summer sections on both the Lyndhurst and Paramus campuses. Information from Department Section Availability Reports, 2012-2016.

## Assessment

[Ways in which the program addresses the college's commitment to assessment and assesses its program learning outcomes, changes that have been made to the curriculum as a result of assessment, ...]

BCC Program Assessment is handled in the following way, according to the format prescribed by the Assessment Office:

**Program Learning Goal(s) or Outcome(s)** to be assessed:

The Biology assessment information can be found at <http://bergen.edu/about-us/institutional-effectiveness/assessment/assessment-of-student-learning/academic-assessment-plans-and-reports/past-academic-assessment-reports/>

PLG 4: Students will have a heightened understanding of the unity, variety and evolution of life, and recognition of the importance of the stewardship and preservation of biological diversity

### **Means of Assessment:**

Since there are no standardized exams which would encompass application of evolution and biological diversity covering the mastery courses BIO-221 *Comparative Vertebrate Anatomy*, BIO-224 *Environmental Microbiology* and BIO-225 *Invertebrate Zoology* our department chose to use a direct method of assessment in the form of locally developed tests. These test questions focus more clearly on the intended learning outcome as it pertains to each mastery course. The assessment questions were given to the students embedded in course exams so there was no bias in question significance.

### **SEMESTER 2: DEVELOPING ASSESSMENT TOOL (s) and TIMELINE**

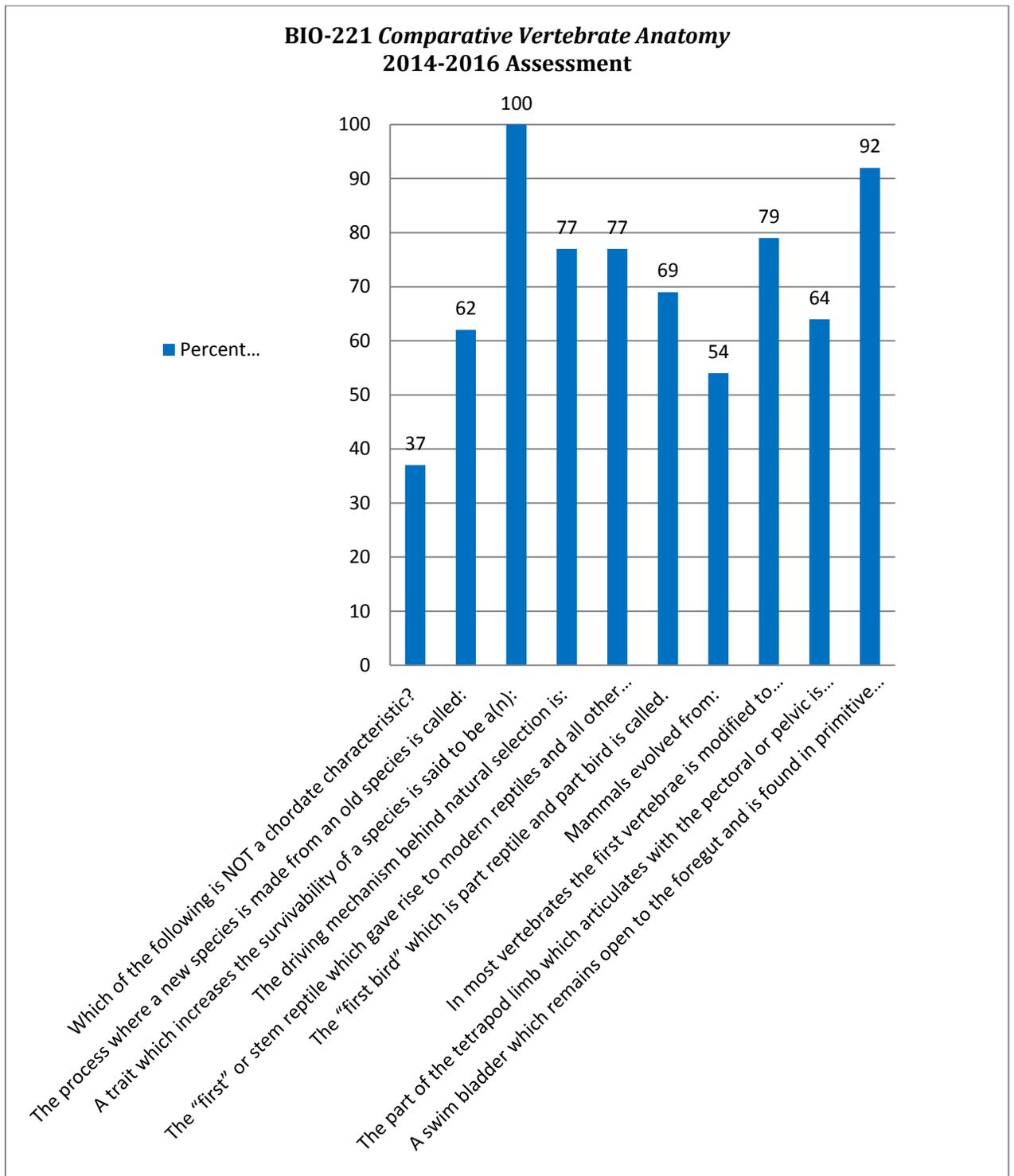
BIO-221, BIO-224, and BIO-225 are offered during different semesters/academic years so the data was collected when the courses were offered during our two-year assessment cycle. Data was then analyzed by the subcommittee during the spring break 2016. A preliminary report was then forwarded to the faculty which collected the data for review and comments to compile the "Closing the Loop" or "Use of Results" section of the report. Once the faculty involved in data collection commented, a draft of the final report was then forwarded to entire department for review and additional comments prior to submission. The department would like to see 70% of students get each question correct.

### **SEMESTER 3: COLLECTING AND ANALYZING DATA**

Results indicate that some of the questions in the assessment did not get 70% correct responses. See the attached Excel Spreadsheet.

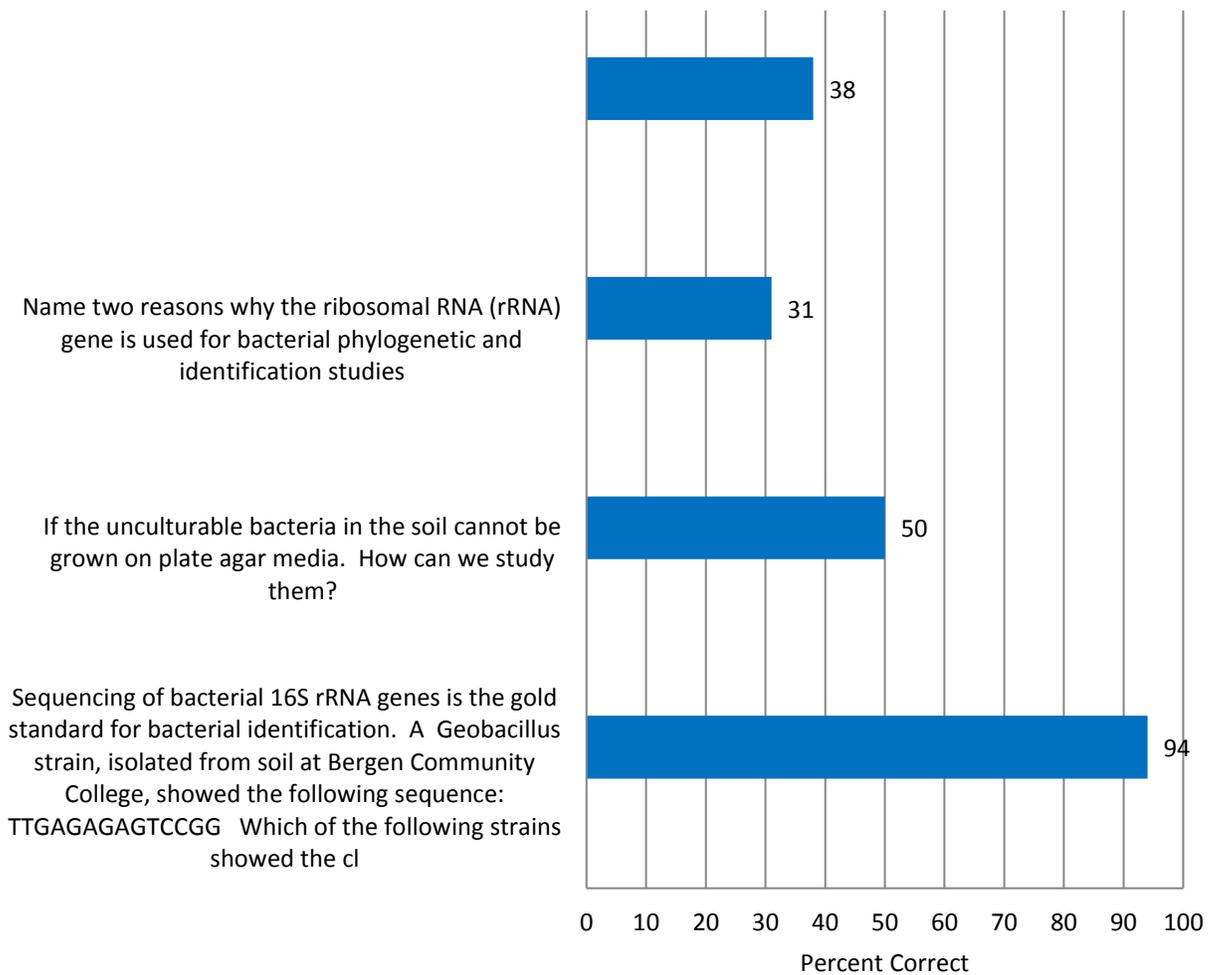
For BIO-221 *Comparative Vertebrate Anatomy (CVA)* more than half of the students were not able to correctly identify what was not a chordate characteristic. Approximately half of the

students knew what mammals evolved from. Greater than 60% of students were aware of the process where a new species is made from an old species.



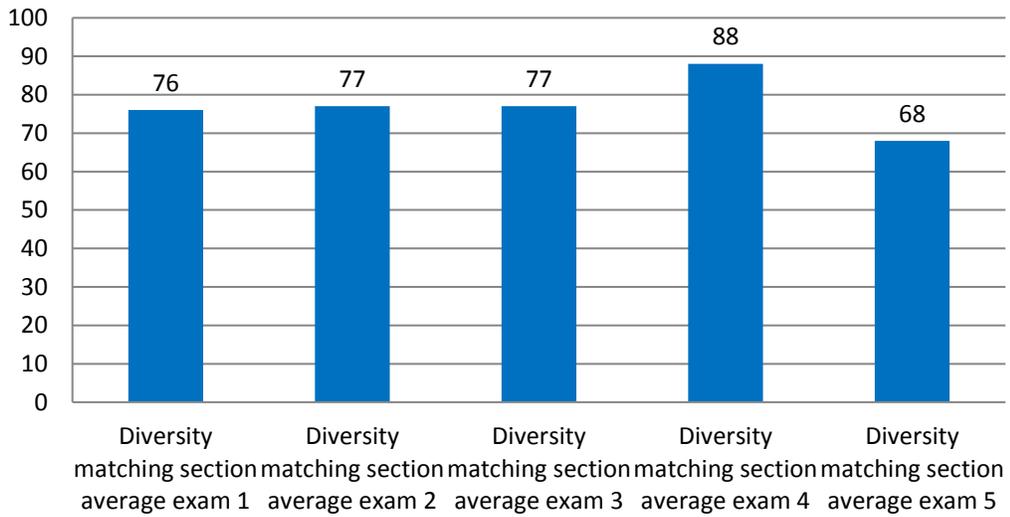
For BIO-224 *Environmental Microbiology* only half the students could devise a way to grow bacteria other than on an agar plate. Most students were not able to cite two reasons for using ribosomal RNA for phylogenetic and identification studies.

**BIO-224 Environmental Microbiology  
2014 - 2016 Assessment**

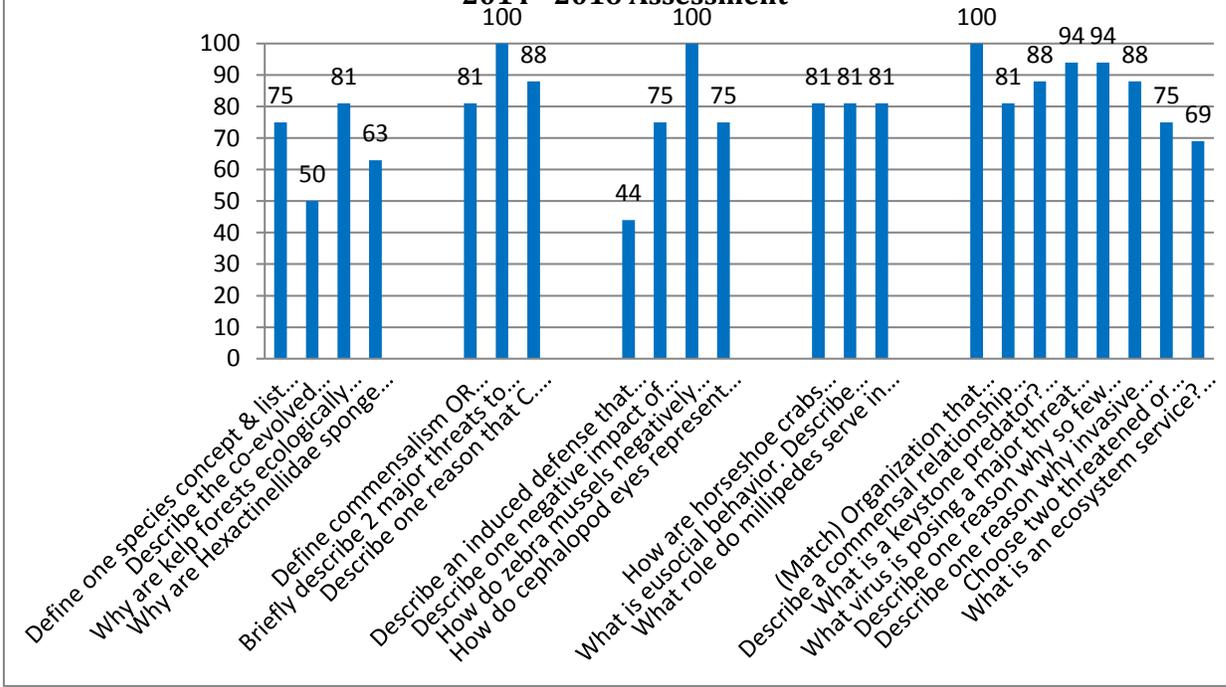


In BIO-225 *Invertebrate Zoology* all students correctly completed the diversity matching for each unit on exams. However, less than half the students were able to describe an induced defense that has evolved between rotifer species and half the students could describe coevolved relationship between Dinoflagellates and corals and how this relationship is threatened. Less than 70% of students knew why sponge reefs were important and could describe major risks to these reefs.

**BIO-225 Invertebrate Zoology (Matching)  
2014 - 2016 Assessment**



**BIO-225 Invertebrate Zoology (Fill-in Questions)  
2014 - 2016 Assessment**



## **Recommendations for Improvement:**

Assessment questions will be reviewed for clarity, and instruction will be modified in order to more clearly convey the related curricula material. Modifications for instruction will include investigating more specific examples in class and laboratory through video, podcast, collaborative activities and utilizing case studies related to the topics which were deficient in the results section. Supplementary homework and class assignments may also be implemented.

## **SEMESTER 4: CLOSING THE LOOP AND SHARING KNOWLEDGE**

### **Use of Results:**

The same assessment will be repeated for the next cycle with the suggested improvements implemented.

Preliminary data evaluated for the 2016-2017 academic year indicates that BIO-221 and BIO-225 have reached the goal of 70% of students getting questions correct. BIO-224 data is currently being collected and evaluated.

## **Innovations or Changes in Last Five Years**

[New issues, significant changes, improved methodologies, ...]

We now have the ADInstruments equipment and the software uploaded to department laptops. We will be able to implement use of this equipment for students in the Anatomy and Physiology courses (health professions prerequisite courses). This will enable them to record physiological data and evaluate the data. They will also be capable of designing hypothesis driven laboratory exercises and critically examine the experimental design, data collected and potential variables affecting the experiment.

We currently have students involved in lab research projects related to PCR detection, cloning and characterization of microorganisms; DNA sequencing and analysis; molecular characterization from microbiome of luna moths; population genetic studies; stress induced alterations in Electroencephalogram (EEG). These projects are vital to get students actively involved in scientific research so they fully appreciate the impact of science and will pursue STEM degrees. These STEM degrees will make our students more marketable in the future.

## **Data Needs**

What additional data that is currently not available would have been helpful to effectively evaluate this area of the program?

We would like to obtain data that would tell us the number of evening students that are Biology majors. This would help us to evaluate the need for evening sections of our Biology electives.

We would like to provide students, faculty, staff, and visitors with a catalog to reflect the most current program information available.

## Department Programs

### 1) Biology Program AS.NSM.BIO

The Biology Program shown below can be found at <http://bergen.smartcatalogiq.com/en/2016-2017/Catalog/Academic-Programs/AS-Degree-Programs-in-Natural-Sciences-or-Mathematics/Natural-Sciences-or-Mathematics-AS-Biology-Option> and the BCC **Biology Department Website**: [BCC Homepage/Academics/Academic Divisions Departments/Biology/Degree Options/AS Biology](http://bergen.smartcatalogiq.com/en/2016-2017/Catalog/Academic-Programs/AS-Degree-Programs-in-Natural-Sciences-or-Mathematics/Natural-Sciences-or-Mathematics-AS-Biology-Option)

#### First Semester

BIO-101	General Biology I	4
CHM-140	General Chemistry I*	3
CHM-141	General Chemistry Lab I	1
MAT-180	Precalculus: college Algebra and Trigonometry	4
WRT-101	English Composition I	3
		<b>15</b>

#### Second Semester

BIO-203	General Biology II	4
CHM-240	General Chemistry II	3
CHM-241	General Chemistry Lab II	1
WRT-201	English Composition II	3
MAT	Statistics** or Calculus I	3-4
.....	Humanities Elective***	3
		<b>17-18</b>

#### Third Semester

BIO	Biology Elective****	4
.....	Social Science Elective***	3
.....	Humanities Elective***	3
.....	Natural Science Elective/Computer Science Elective	4
.....	General Education Elective*****	3
		<b>17</b>

#### Fourth Semester

BIO	Biology Elective****	4
.....	Social Science Elective***	3
COM-100	Speech Communication	3
.....	Humanities Elective***	3
.....	Humanities Elective***	3
		<b>16</b>
<b>Degree Credits 65-66</b>		

\*If a student needs to complete *Introduction to Chemistry* (CHM-100) before registering for *General Chemistry I* (CHM-140); CHM-100 can be used as the Natural Science Elective in the third semester.

\*\*Students can choose MAT-150 or MAT-268. Before selecting your statistics elective, check the requirements of the schools you are considering for transfer.

\*\*\*General Education elective

\*\*\*\*Students must choose among the following courses: BIO-221, BIO-222, BIO-224, BIO-225, BIO-227, BIO-228, or BIO-229.

\*\*\*\*\*Students can choose WEX-101 (2 cr.) and a WEX experience course (1cr.): WEX-201, WEX-202, WEX-204, WEX-205, WEX-206, or WEX-208 to fulfill this elective for **three** credits.

Source: 2014-2015 BCC Catalog

## 2) Biotechnology Program AS.NSM.BIO.TECH

The Biotech Program shown below can be found at

<http://bergen.smartcatalogiq.com/en/2016-2017/Catalog/Academic-Programs/AS-Degree-Programs-in-Natural-Sciences-or-Mathematics/Natural-Sciences-or-Mathematics-AS-Biology-Option> and the BCC **Biology Department Website**: BCC Homepage/Academics/Academic Divisions Departments/Biology/Degree Options/AS Biotech

### First Semester

BIO-101	General Biology I	4
CHM-140	General Chemistry I	3
CHM-141	General Chemistry Laboratory I	1
WRT-101	English Composition I	3
.....	Humanities Elective*	3
.....	Social Science Elective*	3
		<b>17</b>

### Second Semester

BIO-203	General Biology II	4
CHM-240	General Chemistry II	3
CHM-241	General Chemistry Laboratory II	1
MAT-150	Statistics	3
WRT-201	English Composition II	3
.....	Humanities Elective*	3
		<b>17</b>

### Third Semester

BIO-210	Introduction to Biotechnology	4
MAT-180	Precalculus: College Algebra and Trigonometry	4
.....	Humanities Elective*	3
.....	Humanities Elective*	3
.....	Social Science Elective*	3
		<b>17</b>

### Fourth Semester

BIO	Introduction to Bioinformatics	4
COM	Com-100 Speech Communication or COM-102 Public Speaking	3
MAT-280	Calculus I	4
.....	Free Elective**	3
		<b>14</b>
<b>Degree Credits 65</b>		

\*General Education Elective

\*\*Students can choose WEX-101 (2 cr.) and a WEX experience course (1cr.): WEX-201, WEX-202, WEX-204, WEX-205, WEX-206, or WEX-208 to fulfill this elective for **three** credits.

**Source: BCC Smart Catalog** <http://bergen.edu/academics/academic-divisions-departments/biology-horticulture/biology/>

## Biology Course Descriptions

The following course descriptions can be found at <http://bergen.smartcatalogiq.com/en/2016-2017/Catalog/Courses/BIO-BIOLOGICAL-SCIENCES>.

There is also a **syllabus** for each course listed below. They can be found in two places:

- 1) <http://bergen.edu/academics/syllabi-central/>
- 2) The BCC **Biology Department Website**: <http://bergen.edu/academics/academic-divisions-departments/biology-horticulture/biology/course-descriptions/>

### BIO-101 General Biology I

This is the first course in a two-semester sequence in general biology. The course introduces the fundamental principles of biology and their relationships to society. Lecture topics include: an introduction to science, basic chemistry, cell biology, metabolism, genetics, and a survey of the Prokaryotae, Protists, and Fungi. Laboratory exercises develop a proficiency in the use of laboratory equipment and guide students in investigations of biochemistry, cell biology and metabolism, genetics, microbiology, protists, and fungi.

**4 credits General Education Course**

### BIO-103 The Human Body

This is a one-semester course that is concerned with basic chemistry, the human cell, tissues, and the musculoskeletal, nervous, endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary and reproductive systems. The course includes a survey of metabolism and fluid/electrolyte balance. Lectures are supplemented by writing assignments and

discussions. Laboratory exercises include microscopy, dissection, and anatomical and physiological experiments that complement the lecture.

**4 credits    General Education Course**

### **BIO-104 Microbiology**

This is a laboratory science course that emphasizes the principles of biology as they apply to microorganisms. The morphology, anatomy, physiology, growth, metabolism, nutrition, control, and identification of the various microbes, genetics including recombination technology, industrial and clinical case studies in microbiology are discussed. Representative laboratory exercises include staining procedures, media preparation, pure culture techniques, culture identification, and serology.

**4 credits    General Education Course**

### **BIO-107 Introduction to Human Biology**

This course is a human anatomy and physiology course intended for the non-biology major. Biological principles are taught by examining human body systems, homeostasis, and disease. This information, relevant because it applies to their own bodies, will help students understand medical issues, appreciate the importance of exercise and nutrition in maintaining health, and consider environmental concerns including the health effects of pollution and overpopulation. Laboratory exercises include experimentation, microscopy, and dissection.

**4 credits    General Education Course**

### **BIO-108 Introduction to Environmental Biology**

This deals with humans and their interactions with the environment. Topics covered include fundamental aquatic and terrestrial ecology, air and water pollution, world population problems, loss of biodiversity, pesticides, solid waste problems and an extensive review of energy problems and their solutions. Laboratories include measurements of various environmental pollutants, analysis of environmental parameters and descriptive and practical reinforcement of lecture material.

**4 credits    General Education Course**

### **BIO-109 Anatomy and Physiology I**

This course is an introduction to the basic principles of human anatomy and physiology that emphasizes some common diseases in relation to the various body systems. Among the topics considered are the basic plan of the body, tissues, the skeletal system, the muscular system, articulations, cardiovascular system, and the respiratory system. Lectures are supplemented by writing assignments, discussion, and laboratory sessions that include dissection and elementary physiology experiments.

**4 credits    General Education Course**

### **BIO-119 Intensive Wolf Study**

This course deals with an organism that represents the conflicts between humans and wildlife management issues. Taught at the International Wolf Center in Ely, Minnesota, during the winter semester break, students will study captive wolves as well as wolves in their natural habitat. Lecture topics include the biology and ecology of the gray wolf, *Canis lupus*. Afternoon and evening sessions involve field work and independent study.

**3 credits**

### **BIO-130 People-Plant Relationships**

This course explores the effects of plants on biological organisms that influence human economic, social and psychological behavior. The course will focus on two major themes: 1) plants as sources of food, shelter, clothing, drugs, and industrial raw material; and 2) the influence of plant life on human cultural diversity, biotechnology, medicine, and conservation efforts.

**4 credits    General Education Course**

### **BIO-131 General Botany**

This course is an introduction to the biology of plants. The course includes an analysis of plant structure and function, an explanation of the principles of plant genetics, an exploration of plant evolution, and an examination of plant ecology. The importance of plants to people will be illustrated through discussions of people's ecological and economic dependence upon plants. The course content will be presented through lectures, demonstrations, and laboratory exercises.

**4 credits    General Education Course**

**BIO-203 General Biology II**

General Biology II explores the evolution and biodiversity of representative organisms in the plant and animal kingdoms. Studies of plants investigate diversity, structure, and the physiology of absorption, transport, and photosynthesis. Students will examine the structure and life cycles of invertebrate and vertebrate animals. In a unit on Ecology, students will learn how living organisms interact with their environment. Laboratory exercises utilizing observation, experimentation, microscopy, and dissection provide practical demonstrations of the topics covered in lecture.

**4 credits    General Education Course    Prerequisite(s):** BIO-101

**BIO-209 Anatomy and Physiology II**

This course continues the study of human anatomy and physiology. Among the topics considered are the digestive system, metabolism, urinary system, fluid and electrolyte balance, the nervous system, the endocrine system, and the reproductive system. Lectures are supplemented by writing assignments, discussion and laboratory sessions that include dissection and elementary physiology experiments.

**4 credits    General Education Course;    Prerequisite(s):** BIO-109 C or better

**BIO-210 Introduction to Biotechnology**

This course is designed to give students both a theoretical background and a working knowledge of the instrumentation and techniques employed in a biotechnology laboratory. Emphasis will be placed on the introduction of foreign DNA into bacterial cells, as well as the analysis of nucleic acids (DNA and RNA) and proteins.

**4 credits    Prerequisite(s):** BIO-101

**BIO-211 Introduction to Bioinformatics**

This course is designed to give students both a theoretical background and a working knowledge of the techniques employed in bioinformatics. Emphasis will be placed on biological sequence (DNA, RNA, protein) analysis and its applications.

**3 credits    Prerequisite(s):** BIO-101, BIO-210

**BIO-217 Sustainability in Nature**

Our Earth's systems, natural and human, are experiencing sudden and dramatic changes that challenge their sustainability. The principles and practices of sustainability need to be interdisciplinary so that current needs are met without compromising the needs of future generations. This course provides a fundamental knowledge of these topics and the balance of the multiple interactions. Discussions will include responsible environmental stewardship through the actions of individuals and of private & public sectors.

**4 credits    Prerequisite(s):** BIO 108; BIO-130; or BIO-131

**BIO-221 Comparative Vertebrate Anatomy**

This course is a study of the body structures of some representative vertebrate animals and of their functional and evolutionary relationships. Laboratory exercises include detailed dissection of the lamprey eel, the dogfish, the mudpuppy, the cat, and other animals.

**4 credits    Prerequisite(s):** BIO-101, BIO-203

**BIO-222 Embryology**

This course is the study of vertebrate embryonic development from gametogenesis and fertilization to the development of the body organs. Laboratory exercises include experiments with living sea urchins, Japanese medaka fish, frogs, and chick embryos, as well as microscopic examination of the various sections of the embryos.

**4 credits    Prerequisite(s):** BIO-101, BIO-203

**BIO-224 Environmental Microbiology**

This course is the study of bacteria and other microorganisms and their role in the environment. Topics will include an introduction to the main groups of microorganisms and their physiology, soil microbiology, cycles of elements, aquatic microbiology, sewage treatment, bioremediation, and applied microbiology encompassing food microbiology, industrial microbiology, and biotechnology.

**4 credits    Prerequisite(s):** BIO-101, BIO-203

**BIO-225 Invertebrate Zoology**

Invertebrate Zoology is a survey of the organisms without backbones, the invertebrates. Topics include the taxonomic concepts of cladistics versus the Linnaean phylogenetic study of these organisms. Concepts such as protostomes, deuterostomes, the development of the coelom, metamorphosis, etc., will be discussed. Laboratory sessions include external and internal examinations (dissections) of these organisms and descriptive and practical reinforcement of lecture material.

**4 credits****Prerequisite(s):** BIO-101, BIO-203**BIO-227 Principles of Ecology**

This course deals with terrestrial and aquatic ecology. Topics covered include abiotic characteristics of ecosystems as well as detailed discussions of populations, communities, ecosystems and biomes. Discussions also include such topics as ecological succession and paleoecology. Qualitative and quantitative data of ecosystems is gathered during the early part of the semester in which ecological data will be collected during field experiences. These data will be analyzed during the second half of the semester in the laboratory. Statistical analysis and report writing will also be stressed.

**4 credits****Prerequisite(s):** BIO-101, BIO-203**BIO-228 Introduction to Marine Biology**

This course deals with a basic introduction to marine environments, emphasizing ecological principles governing marine life throughout the world. Topics include basic oceanography, marine ecological systems, planktonic communities, deep-sea biology, subtidal and intertidal ecology, estuarine and coral reef communities, human impact, mariculture and pollution. Lab sessions will include in-house lab exercises, field experiences, analysis of data, group projects and report writing.

**4 credits****Prerequisite(s):** BIO-101, BIO-203**BIO-229 Tropical Marine Ecology**

This course covers characteristics of populations, communities, and ecosystems found in tropical regions. Taught at the Keys Marine Laboratory in Long Key, Florida, during the summer semester, students study coral reef structure and ecology, the intertidal zone, mangrove and terrestrial communities, interstitial organisms, and trophic relationships. Lab sessions include field experiences, group projects and report writing.

**4 credits****Prerequisite(s):** BIO-101, BIO-203

## 2017 AS.NSM.BIO Curriculum Map

Identify in which courses the program learning outcomes are being taught and whether the program learning outcomes are introduced, reinforced or mastered.

**KEY:**

**I** – Introduced      **R** – Reinforced / Practiced      **M** – Mastery at exit level [indicate how assessment evidence is collected]

Program/Discipline Student Learning Outcomes*						
Students will be experienced in the organization and	Students will acquire knowledge of the physiological and	Students will be knowledgeable in the developmental processes	Students will have a heightened understanding of the unity, variety and	Students will acquire laboratory competence by developing	Students will have the ability to critically examine information	

	classification principles employed in biological sciences	biochemical processes in a variety of organisms and the interrelationships of living systems	which occur in various organisms	evolution of life, and recognition of the importance of the stewardship and preservation of biological diversity	and refining technical and analytical skills	and discover new knowledge through rigorous scientific reasoning
BIO-101	Introduced	Introduced	Introduced	Introduced	Introduced	Introduced
BIO-203	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced
<b>BIO ELECTIVES:</b>						
BIO-201 to be changed to BIO-221	Mastery Assessment: lecture exams, quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	Mastery Assessment: Lecture exams, quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	Mastery Assessment: Lecture exams, quizzes, laboratory reports and quizzes. Class participation or a term paper may be considered.	Mastery Assessment: Based on student performance on lecture examinations, quizzes, laboratory reports, laboratory quizzes, and class participation. A term paper may be assigned at the option of the instructor.	Mastery Assessment: Based on student performance on laboratory practical exams, reports, quizzes, and participation.	Mastery Assessment: Lecture examinations, quizzes; laboratory reports, quizzes, and participation. A term paper may be assigned.
BIO-202 to be changed to BIO-222	Mastery Assessment: lecture exams, quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	Mastery Assessment: lecture exams, quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	Mastery Assessment: Lecture exams, quizzes, laboratory reports and quizzes. Class participation or a term paper may be considered.	Mastery Assessment: Based on student performance on lecture examinations, quizzes, laboratory reports, laboratory quizzes, and class participation. A term paper may be	Mastery Assessment: Based on student performance on laboratory practical exams, reports, quizzes, and participation.	Mastery Assessment: Lecture examinations, quizzes; laboratory reports, quizzes, and participation. A term paper may be assigned.

				assigned at the option of the instructor.		
BIO-225	Mastery Assessment: lecture exams, quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	Mastery Assessment: lecture exams, quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	Mastery Assessment: Lecture exams, quizzes, laboratory reports and quizzes. Class participation or a term paper may be considered.	Mastery Assessment: Based on student performance on lecture examinations, quizzes, laboratory reports, laboratory quizzes, and class participation. A term paper may be assigned at the option of the instructor.	Mastery Assessment: Based on student performance on laboratory practical exams, reports, quizzes, and participation.	Mastery Assessment: Lecture examinations, quizzes; laboratory reports, quizzes, and participation. A term paper may be assigned.
BIO-227	Mastery Assessment: lecture exams, quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	Mastery Assessment: lecture exams, quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	Mastery Assessment: Lecture exams, quizzes, laboratory reports and quizzes. Class participation or a term paper may be considered.	Mastery Assessment: Based on student performance on lecture examinations, quizzes, laboratory reports, laboratory quizzes, and class participation. A term paper may be assigned at the option of the instructor.	Mastery Assessment: Based on student performance on laboratory practical exams, reports, quizzes, and participation.	Mastery Assessment: Lecture examinations, quizzes; laboratory reports, quizzes, and participation. A term paper may be assigned.
BIO-228	Mastery Assessment: lecture exams,	Mastery Assessment: lecture exams,	Mastery Assessment: Lecture exams,	Mastery Assessment: Based on student	Mastery Assessment: Based on student	Mastery Assessment: Lecture examinations,

	quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	quizzes, laboratory reports and quizzes. Class participation or a term paper may be considered.	performance on lecture examinations, quizzes, laboratory reports, laboratory quizzes, and class participation. A term paper may be assigned at the option of the instructor.	performance on laboratory practical exams, reports, quizzes, and participation.	quizzes; laboratory reports, quizzes, and participation. A term paper may be assigned.
BIO-229	Mastery Assessment: lecture exams, quizzes, laboratory reports and quizzes. Class participation or a term paper may be assigned at the option of the instructor.	Mastery Assessment: lecture exams, quizzes, laboratory reports and quizzes. A term paper may be assigned at the option of the instructor.	Mastery Assessment: Lecture exams, quizzes, laboratory reports and quizzes. Class participation or a term paper may be considered.	Mastery Assessment: Based on student performance on lecture examinations, quizzes, laboratory reports, laboratory quizzes, and class participation. A term paper may be assigned at the option of the instructor.	Mastery Assessment: Based on student performance on laboratory practical exams, reports, quizzes, and participation.	Mastery Assessment: Lecture examinations, quizzes; laboratory reports, quizzes, and participation. A term paper may be assigned.

*Adapted from Community College of Philadelphia's Curriculum Map template*

## 2017 AS.NSM.BIO.TECH Curriculum Map

Identify in which courses the program learning outcomes are being taught and whether the program learning outcomes are introduced, reinforced or mastered.

**KEY:**

*I – Introduced      R – Reinforced / Practiced      M – Mastery at exit level [indicate how assessment evidence is collected]*

Program Specific Required Courses (Do not include General Education courses or unrestricted electives.)	Program Learning Outcomes						
	Demonstrate knowledge of the methodology of biotechnology, including genetic modification, isolation, purification, and analysis of nucleic acids and proteins.	Acquire the skills necessary to properly handle genetically modified organisms and employ the safeguards necessary when working with such organisms.	Acquire laboratory competence by developing and refining technical and analytical skills	Develop the ability to critically examine information and discover new knowledge through rigorous scientific reasoning.	Demonstrate knowledge of the practice of proper scientific laboratory record keeping	Acquire knowledge of a variety of currently available genomic and proteomic databases	Acquire the skills required to analyze biological sequences and interpret the results of their analyses
BIO-101	Level: Introduced	Level: Introduced	Level: Introduced	Level: Introduced	Level: Introduced	Level: Introduced	Level: Introduced
BIO-203	Level: Reinforced	Level: Reinforced	Level: Reinforced	Level: Reinforced	Level: Reinforced	Level: Reinforced	Level: Reinforced
BIO-210	Level: Mastery	Level: Mastery	Level: Mastery	Level: Mastery	Level: Mastery		
	Measure: Measure: Assessed by lecture and laboratory exams	Measure: Students will be evaluated by laboratory observation, laboratory exams	Measure: Students will be evaluated by laboratory observation, laboratory exams	Measure: Students will be evaluated by lecture and laboratory examinations, student papers, and	Measure: Students will be evaluated by lecture and laboratory examinations, student papers, and		

		or lab reports and student projects.	or lab reports.	laboratory notebooks.	laboratory notebooks.		
BIO-211				Level: Mastery	Level: Mastery	Level: Mastery	Level: Mastery
				Measure: Students will be evaluated by lecture and laboratory examinations, student papers, and laboratory notebooks.	Measure: Students will be evaluated by lecture and laboratory examinations, student papers, and analysis of online genomic information.	Measure: Assessed by lecture and laboratory exams and analysis of online genomic information	Measure: Assessed by lecture and laboratory exams and project evaluation

*Adapted from Community College of Philadelphia's Curriculum Map template*

## FOCUS ON SUPPORT

Reflect on the support issues related to this program — **please comment on only those which are applicable to this program.** To what degree are they met, where are there kudos to be given, changes that have taken place, improvements to be made, ...?

### Facilities and Equipment

[Cycles for replacement or refurbishment of equipment, classroom spaces, labs, furniture, concerns, needs, ...]

The Department of Biology and Horticulture maintains the following spaces on the **Paramus Campus** in the Pitkin Education Building:

### Pitkin Laboratories

#### Second Floor

S-205	BIO-104 Microbiology
S-209	BIO-104 Microbiology
S-212	BIO-103 The Human Body BIO-107 Introduction to Human Biology
S-216	BIO-210 Biotechnology
S-217	BIO-109 Anatomy and Physiology I
S-221	BIO-109, Anatomy and Physiology I BIO-209 Anatomy and Physiology II
S-225	BIO-209 Anatomy and Physiology II

#### Third floor

S-306	BIO-101 General Biology I
S-309	BIO-101 General Biology I BIO-203 General Biology II BIO-225 Invertebrate Zoology
S-312	BIO-108 Introduction to Environ. Biology BIO-221 Comparative Vertebrate Anatomy BIO-227 Principles of Ecology BIO-228 Introduction to Marine Biology BIO-229 Tropical Marine Ecology

### Pitkin Prep Rooms

#### Second Floor

S-207	Microbiology
S-208	Microbiology
S-210	Microbiology
S-211	Anatomy and Physiology
S-224	Anatomy and Physiology

### Third Floor

S-308	General Biology and others
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### Pitkin Prep Offices

S-220	S-307
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### Pitkin Storage Rooms

S-211A	Anatomy and Physiology
S-214	General Storage
S-220A	Anatomy and Physiology
S-220B	Microscope Prep and Storage

Full time faculty offices are found on the second floor in the vicinity of the second floor laboratories.

The Department of Biology and Horticulture maintains the following spaces on the **Lyndhurst Campus**:

### Lyndhurst Laboratories

LYN-514	BIO-103 The Human Body BIO-107 Introduction to Human Biology BIO-109 Anatomy and Physiology I BIO-209 Anatomy and Physiology II
LYN-515	BIO-108 Introduction to Environ. Biology BIO-130 People-Plant Relationships BIO-131 General Botany

### Lyndhurst Prep and other rooms

LYN-512	Prep Room
LYN-513	General Storage

There is one full time faculty office and it is found on the fifth floor in the vicinity of the fifth floor laboratories.

Overall, the situation with regard to facilities and equipment is quite favorable. As instructors, we have been fortunate to be able to provide to our students an enriched learning environment. We have been able to provide modern laboratory space, living and preserved specimens, medical grade microscopes, comprehensive slide collections, detailed biology models, skeletons, physiology equipment, etc. Recent renovations have improved our laboratories and classrooms.

Computer-assisted projection equipment has been added to our classrooms and this has greatly improved our ability to illustrate and explain the material we teach. Despite the considerable progress that we have made over the years there is still room for improvement. It is my view that the most valuable evaluation and suggestions for future planning of the facilities and equipment in use at the college are made by the faculty and staff that use it on a day to day basis. Biology faculty have been working diligently to implement new equipment and methodology such as computer assisted instruction in Anatomy and Physiology classes and simulated cadavers for demonstrations of human anatomy. Instructors have been conscientious about maintaining our slide collection by replacing broken or old slides as necessary. Our collection is continually reviewed to add new slides when needed to update laboratory instruction. New detailed and accurate models have been added to improve our instruction of the structure of living organisms and the relationship of their parts. We can point to our solid laboratory program in Biology as one of our strongest and most effective attributes. The laboratory is the place where students actually do science. It is our hope that the college will continue to provide the materials and equipment that are necessary for us to do the most effective job possible in teaching our students the importance and relevance of Biology to their lives. The following recommendations are made from the perspective of improving our ability to offer our students the highest quality education we can.

The microscopes that are used for most of our Biology Laboratory classes are Leica model ATC 2000 microscopes. The classes they are used for include: BIO 101 *General Biology I*, BIO-103 *The Human Body*, BIO-107 *Introduction to Human Biology*, BIO-108 *Introduction to Environmental Biology*, BIO-109 *Anatomy and Physiology I*, BIO 203 *General Biology II*, BIO-209 *Anatomy and Physiology II*, BIO-221 *Comparative Vertebrate Anatomy*, BIO-225 *Invertebrate Zoology*, and BIO-228 *Introduction to Marine Biology*. In BIO-104 *Microbiology*, the students use Leica DME microscopes. The microscopes are constantly in use due to the very high numbers of lab sections that we run in Biology. Their use in introductory college courses taken by students who often are inexperienced in the operation of microscopes places great demands on their durability. The microscopes have been in service for a long time. The microscopes were purchased in three groups, beginning in 1996 (85), and then in 1998 (26), and 2000 (50), so the oldest have been in use for 21 years. The microscopes are showing the effects of their long service and heavy usage. We have experienced problems with stage components loosening and detaching and slide holders becoming bent and misaligned. Condensers are prone to coming out of position and have needed repairs. Lenses have required frequent cleaning and often replacement. Upkeep and maintenance of these microscopes has been expensive. It is recommended that we replace our current microscopes with newer and more durable microscopes. In our microbiology laboratories we are using a newer Leica model, the DME model or newer model and they seem to be holding up well. Perhaps we should replace our older set of microscopes with these newer models.

We currently have a total of thirty Bausch and Lomb dissecting microscopes, including 18 on the third floor including six each in S-306, S-309 and S-312. This provides one microscope for each table of four students in S-306, S-309 and S-312. It would be beneficial to increase the number of dissecting microscopes used in *General Biology I* and *General Biology II* so that we could supply one per pair of students. For the BIO-225 *Invertebrate Zoology* class one per student is recommended. There are nine dissecting microscopes on the second floor including three in S-205, three in S-209, one in S-221 and two in S-225.

Our Biotechnology laboratory, S-216, has some of the most sophisticated biotechnology equipment on the market today. Below is a partial list of the equipment:

Ultracam Gel Documentation Systems	Eppendorf Mastercycler
Eppendorf 5415 D Microcentrifuges	Eppendorf 5301 Vacufuge Concentrator
BIO-RAD Mini-Trans Blot Cell with tank and lid	BIO-RAD White Light Transilluminator, 120V
BIO-RAD SmartSpec Plus Spectrophotometer	BIO-RAD Model 680 Microplate Reader With Internal Thermal Printer
BIO-RAD 0.5 to 10 microliter Digital Micropipettes	Branson Sonifier 150 Sonicator
BIO-RAD 2 to 20 microliter Digital Micropipettes	Yamato Portable Top Loading Sterilizer/Dryer 1.8 cubic ft.
BIO-RAD 20 to 200 microliter Digital Micropipettes	Barnstead Labline MaxQ 5000 Floor Model Incubator/Shaker
BIO-RAD 100 to 1000 microliter Digital Micropipettes	Fisher Isotemp General-Purpose Refrigerator/Freezer
Fisher Isotemp Medium Hybridization Incubator	Fisher Isotemp Standard Capacity Refrigerated Incubator
Fisher Isotemp Standard Lab incubator (Medium)	Revco Value Series Ultralow-Temperature Chest Freezer 20.5 cubic ft -10 to -40
BIO-RAD C1000 Thermal Cycler	BIO-RAD Micropulser Electroporator
BIO-RAD MyCycler Thermal Cyclers	Qubit 3.0 Fluorometer
Roche Light Cycler 96 Real-Time Thermal Cycler	Thermo Electron IEC CentraCL5R Refrigerated Centrifuge
Labconco Purifier Class II Biosafety Cabinet	BIO-RAD PowerPac HV Electrophoresis Power Supply
BIO-RAD PowerPac Basic Electrophoresis Power Supplies	

We are currently starting the process of obtaining a moderately priced DNA sequencer for use in our biotechnology laboratory. This will allow students to follow an experimental DNA protocol from the beginning to producing an actual DNA sequence.

### **Technology**

[Hardware and software, technical issues and/or support, instructional issues and/or support, training for faculty, ...]

Each of our 12 laboratories is equipped with a projection system and a basic computer and telephone. These serve the purpose of allowing instructors to project topical information, videos, websites, and other related materials. There is a school-wide Wi-Fi system that usually allows us to access the internet. Each of our labs has a black and white printer for faculty and student work in the lab. Seven of our laboratories have document cameras that are also used to project from instructor materials and other laboratory items. The addition of document cameras in S-306 and S-309 would be an improvement. It would allow instructors to project pages and diagrams from textbooks or laboratory manuals. This would assist in giving the instructions for lab exercises and reviewing laboratory exercises. The document cameras provided in labs S-205, S-209, S-212, S-

217, S-221, S-225 and S-312 are not good for projecting transparencies, however they can be used to project dissections.

Since the Biology laboratories were renovated between 2010 and 2012, we have been unable to connect our laptop computers to Wi-Fi. Computer assisted laboratory exercises were used in BIO-203 *General Biology II* for Photosynthesis and Transpiration. Anatomy and Physiology classes have software that is currently not in use because of the lack of a Wi-Fi connection. At present, we cannot print out data using a wireless connection from the laptops to our laboratory printers. It is recommended that we restore our ability to connect to the Wi-Fi system.

Anatomy and Physiology professors in lab rooms S-212, S-217, S-221 and S-225 can no longer project images directly from a microscope onto the screen. This ability should be restored. AD instruments (Bio. PacKs Systems), which is a computerized physiology laboratory system, needs updated laptops and local area connections for both BIO-109 *Anatomy and Physiology I* and *Anatomy and Physiology II*. Right now, it's not functional.

According to IT, we are in need of new laptops which will support the software used in the department.

As mentioned previously, we purchased, with grant funding, a computerized anatomy and physiology **computer system** for use by students in our Anatomy and Physiology labs.

Our Biotechnology laboratory, in S-216, in the Pitkin Education Building is a **Smart Classroom**.

On our Lyndhurst campus, we have two laboratories on the fifth floor of the academic building: LYN-514 and LYN-515. Lyn-514 is where we schedule our Anatomy and Physiology sections (BIO-103, BIO-107, BIO-109, and BIO-209). Lyn-515 is where we schedule our BIO-108 and BIO-130 and BIO-131. Lyn-514 is a smart classroom and has a computer work station, screen and document camera. LYN-515 is a smaller lab and has a computer work station.

## **Learning Resources**

[Collection of books, databases, journals, videos, ...; learning assistance or tutoring, ...]

## **Library Support: Biology and Horticulture**

The Sidney Silverman Library (<http://bergen.libguides.com/aboutssl>) provides resources for biology and horticulture faculty and students including print and e-books, science journals and media. When possible, electronic formats are purchased because they are accessible from classrooms and laboratories and off-campus. A list of recent library acquisitions (1,304 titles in the last five years) in biology and horticulture can be found in the library catalog.

Library materials can be located by using the online catalog. E-Books and streaming media can be viewed directly from the online catalog, on or off campus. In addition, library materials in support of Biology and Horticulture can also be found in the following subject areas: Technology (Includes environmental technology and engineering); Home Economics (Includes food and

nutrition); Medicine (Useful for Human Body, Human Biology, Human Anatomy and Physiology, etc.); and Geography (Includes Human ecology.)

Library acquisitions, including titles in support of specific topics and new courses, may be recommended by faculty and previewed if necessary with the assistance of the library liaison. The goal is to insure that the collection will be up-to-date and support student research and projects as well as faculty teaching, general interest and reference.

Library instruction is available and can be scheduled by faculty by using the online request form. During library instruction classes, information literacy concepts are presented along with specific library resources in Biology and Horticulture. The Library Liaison and the faculty work together to insure that the students will have the necessary resources available for their research assignments and class presentations. The variety of Library instruction classes taught in Biology and Horticulture can be found in **Appendix 1**.

Online library research guides (Libguides) have been developed for most of the biology and horticulture courses. These guides, which are available from the Library Home Page, provide links to important resources for student research in Biology and Horticulture. A list of Libguides and the usage statistics can be found on the learning resources web site.

Course Textbooks and required readings are available on reserve for student use in the library. The library attempts to purchase at least one print copy of every textbook used at BCC. The Reserve platform is available for classroom support materials. In compliance with Copyright laws, E-reserves require authentication for access. Professors may request print reserves and e-reserves by contacting the E-reserve Librarian and may link to library resources from Moodle.

All students and faculty have access to Inter-Library loan for books and periodical articles that are not owned by the library. To request an interlibrary loan, students and faculty may fill out the online form located on the library home page.

The library collection includes several science databases including: *Access Science*, *JSTOR-Ecology and Botany*, *Science Direct*, *Science Online*, *Green File*, and *Net Anatomy*. General Databases such as ProQuest and Academic Search Premier also provide access to numerous scientific journals.

Weeding of the collection is ongoing and the collection is updated as the library budget permits. The library has received Perkins Grant Funding for three years that was used to purchase library technology equipment and a significant number of books related to the “career-related” areas: horticulture, landscaping, and environmental technology.

According to the link resolver, Serials Solutions, the library has access to 1542 full-text journals in Biology, 2024 full-text journals in Agriculture, Botany and Forestry, 223 full-text journals in Environmental Science and 51 full-text journals in Marine Science. Most of the journals are available online through our general and science databases. The journals are also searchable and linked full text to the BCC Collection via “Google Scholar.” Online subscriptions to two important scientific journals, *Science* and *Nature*, were established three years ago. The library retains print subscriptions to scientific journals that are not available online.

Library technology includes networked computers, WIFI, IPad and other tablets, Kindles, and Nooks. The library houses photocopiers and scanners for student use. The library is open over 80 hours per week with extended hours at the end of the semester.

### **Possible Learning Resources Center areas to address:**

Review and replace dated A.V. materials. There are currently about 160 titles; some of these need to be updated.

Regular weeding of the book collection.

Increased availability of resources for use on mobile devices.

**Tutoring Center.** Student and faculty science tutors are available to all BCC students at no additional cost. Additionally, some instructors maintain office hours in the STEM lab to tutor and advise students. For the tutoring center contact 201-301-1296, Room 132. Hours of operation are Monday-Thursday 9:00am-9:00pm and Fridays 9:00am-4:30pm. There were 189 total visits by biology students during the academic year of 2015-2016. <http://bergen.edu/current-students/student-support-services/tutoring/tutoring-center/>

### **Marketing and Public Relations**

[Brochures, print materials, website, special events, recruitment efforts, ...]

The Department of Biology currently maintains a department website with the following information: Department Chair, Department Secretary, and phone numbers, Pitkin location, Mission Statement, Degree Options, Course Descriptions, Faculty, Frequently Asked Questions, Health Professions Majors, Special Events, and technical Staff. We have a large post card size informational card summarizing the research interests of faculty in our Bergen Molecular Ecology Group (BMEG). We also have developed poster-sized Program Outline and Course Description sheets. These are placed in high traffic areas of the Pitkin Education Building for student and visitor perusal. We also develop posters for every Department of Biology and Horticulture sponsored campus event. Several faculty members have been on our college television station discussing biological topics. <http://bergen.edu/academics/academic-divisions-departments/biology-horticulture/biology/>

### **Support Services**

[Advisement, assessment, testing, job placement, ...]

All faculty members have access to the college Testing Services Center (TC) in room S-127. The Testing Center provides services five days a week from 8:30 – 5:00 or 7 00 p. m. and on Saturdays from 9:00 – 1:00 p. m. Services provided are all Mathematics and English placement testing, proficiency testing for academic areas, test proctoring for online classes, and make-up test proctoring for faculty members. The Testing Center also provides testing services for OSS students with various accommodations. <http://bergen.edu/testing/>

Bergen Community College has a Career and Workforce Development Center located in A-123. The center provides career advice, academic guidance, experiential learning and employment services. <http://bergen.edu/new-students/career-and-workforce-development-center/>

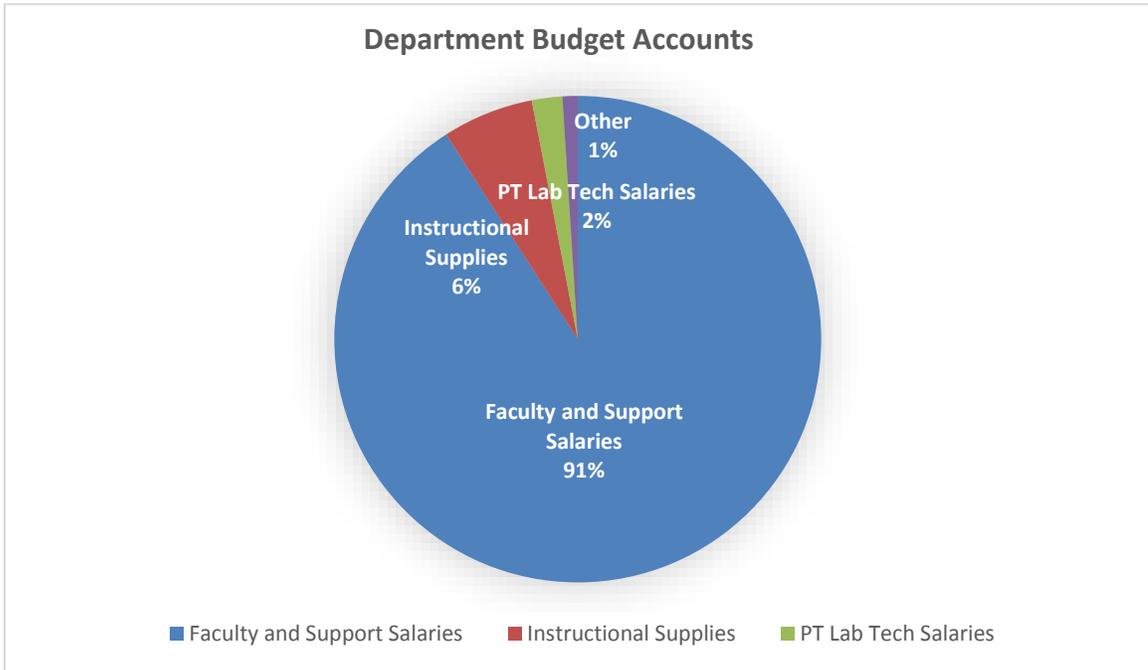
Faculty members advise students in several different locations. They may advise students in the Academic Advising Office in A-118 or individually in their faculty offices during their office hours or by appointment. The Academic Advising Office hours during the fall and spring semesters are based on availability and during the winter and summer periods is open either 8:00 – 5:00 or 7:00 p. m. <http://bergen.edu/new-students/getting-started-at-bergen/academic-advising/>

### **Resources, Budget**

[Staffing, operating and capital budgets, grants, ...]

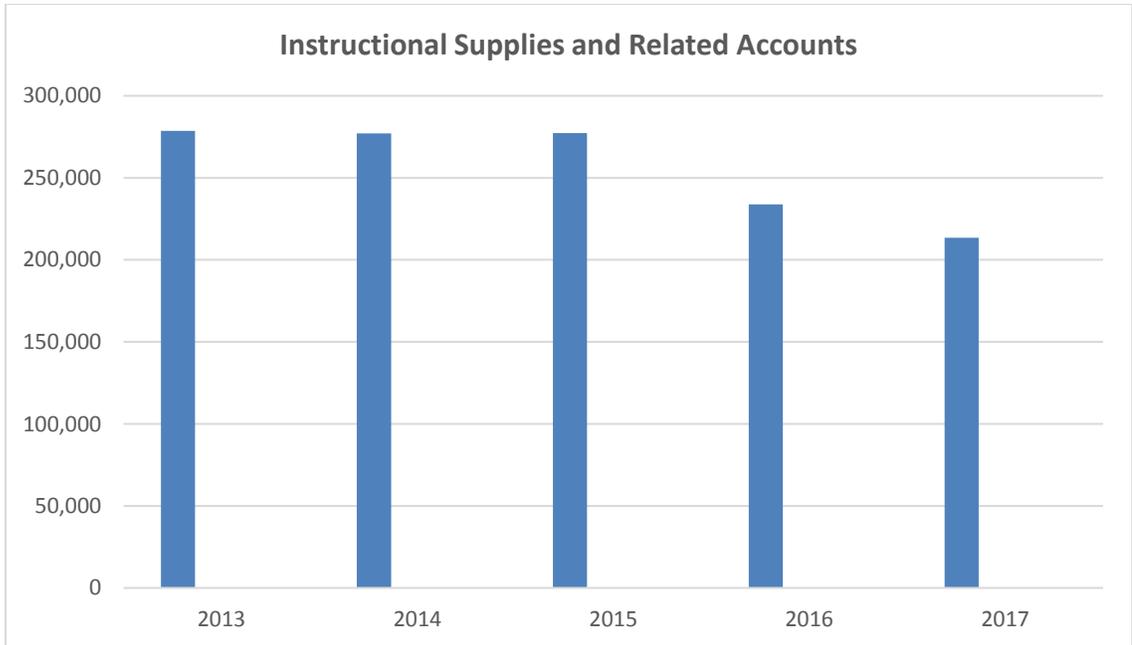
The Department of Biology and Horticulture currently employs 16 full time faculty members: Thirteen are tenured, 1 was recently granted tenure and will be effective in September of 2017, and two are in their fourth year of the five year tenure period. We generally employ between 50 and 60 adjunct instructors in addition to our 16 full time instructors. We employ four full time laboratory technicians and three part-time laboratory technicians. The department shares an administrative assistant with the Department of Physical Sciences.

The department's fiscal year (as a component of the college fiscal year) runs from July 1 to June 30. The department's operating budget for 2016-17 was \$3,153,095 and is divided into 20 accounts: 16 operating budget accounts and 4 capital budget accounts. The three largest operating budget accounts are 1) faculty and support staff salaries (91%), 2) instructional supplies (6%), and 3) part-time laboratory technician salaries (2%). The remaining one percent comprises 13 other much smaller accounts such as office supplies and printing and graphics. Information compiled from Datatel Budget Summary Report 2016-2017. <https://go.bergen.edu/WebAdvisor/WebAdvisor>



Source: Datatel Budget Summary Report 2016-2017.

The Instructional Supply account and related items accounts total \$192,438 for fiscal year 2017. The Instructional Supplies account and related accounts total, has seen a 15% decrease during the last five years.



Source: Datatel Annual Budget Summary Report 2013-2017.

Students taking classes in the Department of Biology and Horticulture currently pay a Biology Consumables Fee (“Lab Fee”) of \$55.00 per student for each course they take. Consumables are

laboratory materials that are used up on a yearly basis. The Biology Consumables Fee also provides laboratory notebooks for student use if their instructors determine they are necessary for their labs. \*The Biology Consumables Fee was initially implemented in the fall of 2010 at \$45.00 per student per course. The lab fee was raised twice and now stands at \$55.00. For the fiscal year 2017, there were 6,518 students enrolled in biology classes. Since each student pays a laboratory fee of \$55.00, the biology courses during the fall 2016 and spring 2017 semester generated a total of \$358,490. This number is greater than the total of the Instructional and related account totals, \$192,438, a difference of \$166,052 (46%). The department is using only 53% of the laboratory fee total. \*Information from Board of Trustees Action A/F3 4-7-2010.

The financial information for our four largest courses is shown below.

### **BIO-109 Anatomy and Physiology I and BIO-209 Anatomy and Physiology II**

Students taking BIO-109 *Anatomy and Physiology I* and BIO-209 *Anatomy and Physiology II* pay the same laboratory fee as other students enrolled in biology classes. Since there are many more sections of BIO-109 and BIO-209 than the other biology courses, 55% of the Biology sections are BIO-109 and BIO-209, and quite a large amount of money is received from these students as laboratory fees. \$762,505 was collected between 2012 and 2016 from 14,725 students.

ENROLLMENT in BIO-109 *Anatomy and Physiology I* and BIO-209 *Anatomy and Physiology II*  
ACADEMIC YEARS 2012 – 2016  
(\*BASED UPON END OF SEMESTER ENROLLMENTS)

#### *BIO-109 Anatomy and Physiology I*

BIO-109	STUDENT TOTALS	LAB FEES RECEIVED (\$45)	TUITION (\$499.20 per 4.0)
2012	1,912	\$86,040	\$954,470
BIO-109	STUDENT TOTALS	LAB FEES RECEIVED (\$50)	TUITION (\$514.20 per 4.0)
2013	1,878	\$93,900	\$965,668
BIO-109	STUDENT TOTALS	LAB FEES RECEIVED (\$55)	TUITION (\$522.22 per 4.0)
2014	1,978	\$108,790	\$1,032,917
BIO-109	STUDENT TOTALS	LAB FEES RECEIVED (\$55)	TUITION (\$530.00 per 4.0)
2015	1,879	\$103,345	\$995,870
BIO-109	STUDENT TOTALS	LAB FEES RECEIVED (\$55)	TUITION (\$540.00 per 4.0)
2016	1,846	\$101,530	\$996,840

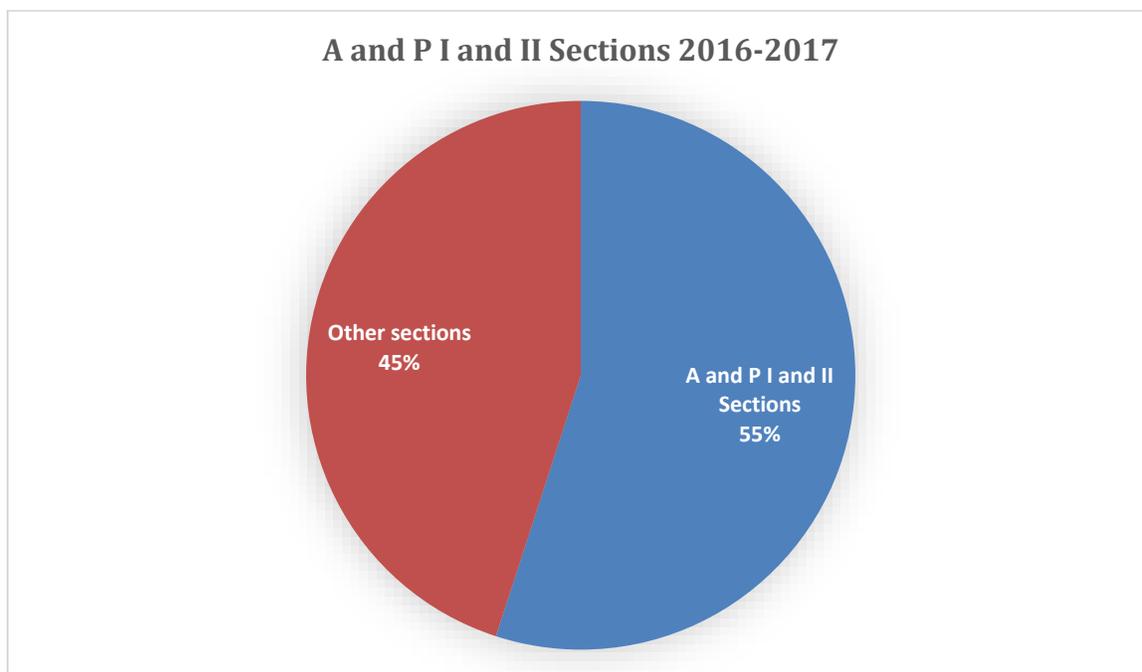
#### *BIO-209 Anatomy and Physiology II*

BIO-209	STUDENT TOTALS	LAB FEES RECEIVED (\$45)	TUITION (\$499.20 per 4.0)
2012	1,053	\$47,385	\$525,658
BIO-209	STUDENT TOTALS	LAB FEES RECEIVED (\$50)	TUITION (\$514.20 per 4.0)
2013	1,006	\$50,300	\$517,285

BIO-209	STUDENT TOTALS	LAB FEES RECEIVED (\$55)	TUITION (\$522.20 per 4.0)
2014	1,034	\$56,870	\$539,955
BIO-209	STUDENT TOTALS	LAB FEES RECEIVED (\$55)	TUITION (\$530.00 per 4.0)
2015	1,071	\$58,905	\$567,630
BIO-209	STUDENT TOTALS	LAB FEES RECEIVED (\$55)	TUITION (\$540.00 per 4.0)
2016	1,008	\$55,440	\$544,320

BIO-109 and 209	STUDENT TOTALS	LAB FEES RECEIVED	TUITION
2012	2,965	\$133,425	\$1,480,128
2013	2,944	\$144,200	\$1,482,953
2014	3,012	\$165,660	\$1,572,872
2015	2,950	\$162,250	\$1,563,500
2016	2,854	\$156,970	\$1,541,160
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TOTAL	14,725	\$762,505	\$7,640,613

The total income from the BIO-109 and BIO 209 student's lab fees and Bergen Community College tuition was \$8,411,371 for the academic years 2012 – 2016 collected from 14, 725 students. This information was taken from 1) Bursar's Office Report at [www.bergen.edu/bursar](http://www.bergen.edu/bursar) 2012-2016, 2) <http://bergen.edu/about-us/institutional-effectiveness/institutional-research>, and 3) Department Section Availability Reports, 2012-2016.



**Source:** Department Section Availability Reports, 2012-2016.

## **BIO-101 *General Biology I***

Students taking BIO-101 *General Biology I*, pay the same laboratory fee as BIO-109 and BIO-209 students as well as other biology students. Since many students take BIO-101 as their first science course in college, as a general education course for 4.0 credits, or as the first course in their Biology major, there are large numbers of students enrolled in this course. The course is offered in the fall, spring, and summer semesters. Since all BIO-101 students pay a laboratory fee, which is the same as all other biology lab fees, we receive large amounts of money from those students as well. There were a total of 6,797 students that took BIO-101 from 2012 spring to fall 2016. Since all these students either paid a \$45.00, \$50.00 or \$55.00 laboratory fee, BCC has collected a total \$359,460 from our BIO-101 students. Information compiled from Department Section Availability Reports, 2012-2016.

## **BIO-104 *Microbiology***

Students taking BIO-104 *Microbiology*, pay the same laboratory fee as BIO-109, BIO-209, and BIO-101 students as well as other biology students. Since many students take BIO-104 in the fall, spring, and summer semesters, we receive large amounts of money from those students. 5,160 students took BIO-104 from 2012 spring to 2016 spring. Since all biology students paid either a \$45.00, 50, 55.00, laboratory fee, BCC has collected a total \$214,420 from our BIO-104 students. Information compiled from Section Availability Reports, 2012-2016.

## **Overall Biology Enrollment 2102-2016**

From the available data, we were able to calculate that there were 31,677 biology students, including BIO-109, BIO-209, BIO-101, and BIO-104, enrolled from 2012 – 2016. This number includes students on both the Paramus and Lyndhurst campuses. Currently there are no biology courses offered on the Hackensack Campus. If each student paid a laboratory fee of either \$45.00, \$50.00, or \$55.00 the Biology department has generated \$1,483,020 from students taking biology laboratory courses. Information compiled from Department Section Availability Reports, 2012-2016.

### **Data Needs**

What additional data that is currently not available would have been helpful to effectively evaluate this area of the program?

No additional data is need at this time.



Our Academic Department Chair, Professor Robert Highley has been a driving force in encouraging the Biology Department's **Community Outreach Programs**. The following programs have been sponsored by the Department of Biology:

Many of the department faculty members have and continue to participate, as instructors, in the **Institute for Learning in Retirement**, an affiliate of Elderhostel at Bergen Community College. Membership is open to all people 55 years and older with a variety of courses available during the school year. <http://bergen.edu/community/institute-for-learning-in-retirement/>

**Organ Donation Awareness Day**-In 2017 we held the 10<sup>th</sup> annual event which features a keynote speaker about Organ Donation and or Transplantation and a panel of individuals who have donated or received an organ or who work in the field of Organ Donation and Transplantation. The real-life stories are very powerful and have made a big impact on students. Several non-science major students have reported that the event brought them to tears and they never thought that would happen in a science class.

In conjunction with the **BCC Addiction Committee** we participated in a skype interview with the author of "Dreamland", Sam Quinones in 2016. The book chronicles the rise of the opioid and heroin epidemic in the United States. In a previous semester students attended a portion of the Addiction Day presentations and studied infections found in intravenous drug users.

**Diabetes Awareness Day** was presented at BCC for six consecutive years from 2008-2013 using the same format as Organ Donation Awareness Day. The events were very powerful and well received and well attended.

**Teen Stem Day** was coordinated by Dr. Judith Fitzpatrick, retired Biology Professor for several years. Local High School students were invited to participate in a day of science activities at the BCC campus.

The **Science Literacy Program** and the Department of Biology presented in 2012, *A Family's Story of How Food Became an Enemy and Changed Their Lives Forever*. The parents of three young children infected with Shiga Toxin Producing *E. coli* spoke to the college community about their experience and the lifelong problems that one of their daughters is experiencing as a result of this food-borne illness.

In 2014 as part of the **Science Infusion Program** and based on her article in Scientific American, Dr. Amy Maxmen presented *Tracking a Curable Killer: Malaria*. After her presentation, Dr. Maxmen was interviewed by BCC science and English students about details of her article and her experience as a science journalist in Africa.

As part of an ongoing "**Meet the Expert Series**" Biology students studied topics and read articles and interviewed the authors who are experts in their fields. BCC students interviewed the Koch Institute lead epidemiologist in the 2011 *Escherichia coli* O104:H4 epidemic; a CDC expert about an *E. coli* foodborne illness caused by cookie dough and a Canadian physician who published an article about a waterborne bacterial epidemic.

Professor Flannery and Dr. Davis co-moderated a session at the AAC&U Annual Meeting in 2010 on integrating the **Millennium Development Goals (UN MDG)** into the Biology curricula, *A Model for Civic Engagement in Undergraduate Biology Education Utilizing Global and Nation Public Health Issues and Service Learning* discussed the community outreach sessions prior to 2010 done on global health issues such as HIV/AIDS, Tuberculosis, Maternal and childhood mortality, etc.

The Biology Department completed seven semester long projects on the global health goals of the **United Nations Millennium Development Goals (UN MDG)**. The UN MDG that were addressed were Eradicate Poverty and Hunger, Reduce Child Mortality, Improve Maternal Health, Combat HIV/AIDS, Malaria and Other Diseases and Ensure Environmental Sustainability. Beginning in the spring 2007 we had students research the specific UN MDG, produce a public service announcement or service learning project, then culminate with awareness days in which experts in that topic came to campus and spoke with students, faculty and the community. The awareness days included World Water Day, HIV/AIDS, Tuberculosis, World Hunger, Malaria, Maternal Health and Child Health. Speakers included United Nations speakers, physicians, nurse practitioners, and a well-known science writer Amy Maxmen.

BCC science student **Skype interview of Kenya Microbiology students**. BCC science students studied malaria and created questions for the Kenyan students who were preparing to work in field in Kenyan to aid in the diagnosis and treatment of malaria.

In 2014, **Barbara Davis, Mary Flannery, Marty Lowe and Jeanie Payne** conducted a new type of “ask the expert” with Lizzy Mwamburi of the University of Eldoret in Kenya. With her students acting as experts, the BCC microbiology and Anatomy and Physiology students asked questions about Malaria and mosquitos and how the WHO is fighting to protect the citizens of Kenya. They returned the favor by asking the BCC students about influenza.

The Department participates in the Fall and Spring **Open Houses** presented by Bergen Community College. We present many aspects of the Biology program to attendees. We also participate in the **Majors Fairs**, also presented by Bergen Community College. We provide information regarding our Biology major including the courses and semester schedules.

### **Community Issues Related to Program**

[Trends, employment trends or projections, transportation, funding]

In the last five years, we have seen a modest decrease (8%) in enrollment of our biology courses. This seems to be opposite the trend that we have observed, although anecdotally, regarding the enrollment at regional four year institutions such as Ramapo College, Montclair State University, William Paterson University, and others. We are not sure of the causes of the differences in enrollment, but this difference needs to be addressed. If the tuition and fee structure at Bergen Community College is lower than the regional four year schools, why are more students choosing to enroll in them than in BCC?

We also have seen data (shown below) that suggests an increased need for professionally trained employees in ten health care and related fields. We need to promote our department

regarding the courses that we offer to prepare students for careers in the health care field as seen in the below table.

Projected 2012-2022 National Employment Growth of Health Care Careers by Industry\*

<b>Professional Career</b>	<b>Growth</b>
Dental Assistants	24.50%
Dental Hygienists	33.30%
Diagnostic Medical Sonographers	46.00%
Emergency Medical Technicians and Paramedics	23.10%
Medical Assistants	29.00%
Phlebotomists	26.70%
Radiologic Technologists	20.80%
Registered Nurses	19.40%
Respiratory Therapists	19.10%
Surgical Technologists	29.80%

\*([www.nasrecruitment.com/uploads/files/healthcare-workforce-outlook-to-2022](http://www.nasrecruitment.com/uploads/files/healthcare-workforce-outlook-to-2022))

### **External Requirements or Considerations**

[Certifications, accreditations, licensures, professional organization status or involvement, ...]

The Department of Biology and Horticulture is not currently, other than this review, involved in any outside certification, accreditation, licensing, or professional organization status procedure. Previously, our department was reviewed as part of the application procedure for the Bergen Community College Chapter of the Beta Beta Beta Honor Society. The application procedure was successful and we were granted our own Beta Beta Beta chapter in April of 2016.  $\beta \beta \beta$  (Tri-Beta) is a National Honor Society for undergraduate students of Biology with chapters at colleges and universities nationwide. Members of the society graduate with honors in Biology.

### **Advisory Boards**

[Advisory Boards' composition and input, number of Advisory Board meetings during the last two years, degree to which the Advisory Council reviews the competencies of the degree or certificates and program courses, timeframes for last reviews, other functions or activities of the Advisory Board, ...]

The Biology program does not offer degrees that require Advisory Boards.

### **Data Needs**

What additional data that is currently not available would have been helpful to effectively evaluate this area of the program?

As previously mentioned, if the tuition and fee structure at Bergen Community College are lower than the regional four year schools, why are more students choosing to enroll in them than at BCC? We need data and/or evidence to answer this question and begin to increase our enrollment.

## SUMMARY

### **Program Achievements, Progress Made Since Last Review**

[Major achievements, changes, implementations, progress made since the time of the last review]

We opened two **new laboratories** (LYN-514 and LYN-515) and a prep room on the fifth floor of our new southern campus building in Lyndhurst.

We opened a **Biotechnology lab** on the second floor in S-216.

We started the **Bergen Molecular Ecology Group (BMEG)**, which provides the opportunity for students to participate in collaborative research under the supervision of faculty members Dr. Elena Tartaglia, Dr. Luis Jimenez and Professor John Smalley. We are part of the Bridges to Baccalaureate (B2B) grant funded by the National Science Foundation. It is a Grant with the goal to increase the number of minority STEM students (Spanish, Black, American Indian, Native Hawaiian and South Pacific Islander) transferring from Bergen Community College to a 4 year College.

Bergen Community College received a \$3.8 million Hispanic-Serving Institution Science, Technology, Engineering and Math grant from the U.S. Department of Education to help students succeed in the STEM fields. We participate in the STEM Student Scholars Program. The purpose is to promote excellence in knowledge, skills and ability of a select group of STEM students to ensure their success in securing research internships and successful transfer to their targeted 4-year institution.

We were granted a chapter of the Biology Honor Society: Beta Beta Beta, the National Honor Society for Undergraduate Biology. We continue to promote the society to our Biology majors.

We added two new biology electives: BIO-224 *Environmental Microbiology* and BIO-225 *Invertebrate Zoology* to the list of biology electives that Biology students can chose to take.

We purchased, with grant funding, a computerized anatomy and physiology computer system for use by students in our Anatomy and Physiology labs.

We renovated of all six of our (biology) laboratories on the second floor and added three renovated laboratories on the third floor. We renovated two lab prep rooms on the second floor (S-208 and S-224) and one prep room on the third floor (S-308). We also renovated three other prep rooms and opened two storage rooms on the second floor.

We have developed an excellent program for the proper **disposal** of our biological and chemical waste products. Please see **Appendix 3** for detailed pick-up locations.

As previously mentioned, Professors Robert Highley as Biology Department Chair and Marty Lowe, BIO-104 course coordinator, completely revised the safety rules for BIO-104 to be compliant with the 2009 CDC/ASM recommendations in the hyperlink below. This was a tremendous effort and we think that we are a model lab for Microbiology safety as a result of their work. Source information: [Biosafety in Microbiological and Biomedical Laboratories \(BMBL\) 5th Edition](#)

As previously mentioned, the Department of Biology and Horticulture has an extensive **Community Outreach Program**.

### **Mission/Goals/Objectives**

[To what degree does the program meet its mission, goals and objectives?]

The Associate of Science degree program (**AS.NSM.BIO**) prepares students to enter various biology and biology related programs leading to a bachelor's degree in four year colleges and universities. The recommended program stresses instruction in basic concepts in biology, chemistry and mathematics. Students will acquire laboratory skills that are necessary for upper division studies in the biological sciences.

Students receiving our AS.NSM.BIO and AS.NSM.BIOTECH are well suited to pursue advanced degrees which focus on biochemistry, molecular biology or organismal biology which are the major biology tracts offered in colleges and universities.

### **Strengths**

[Unique characteristics, special capacities, ...]

Our department has dedicated faculty members who are experts in their fields and continually convey this expertise to their students. Every faculty member interacts with the others to create a productive academic and collegial professional environment. Many of our faculty members conduct laboratory research with their students; many successful projects have been the result of this collaboration. We have great teachers who employ various modes of instruction to get the most out of their students. They strive to have their students succeed in their classes and afterwards in their new academic setting or in their professional careers. We have an excellent technical staff that performs their duties with the most thorough understanding of what they need to do to ensure that our labs run smoothly and efficiently. They are an indispensable part of our department. We have an excellent department secretary who handles her position with much dedication and professionalism. If there is a student, faculty, or staff need, she always tries to help out, solve the problem, or provide direction to the right person or office that can answer the question. Each functional unit of our department, mentioned above, supports the other units and this is why we have a very productive yet collegial department.

Professor Highley promotes collegiality, excellence in teaching and learning, faculty scholarship, community outreach and ensures that the all courses and laboratories are run in a most efficient manner.

Professor Highley is also very supportive of the Biology Technical Staff. He is always available to advise and assist a technician with any Biology related issue.

## **Challenges**

[Concerns, difficulties, areas for improvement, ...]

We would like to replace the two full-time faculty members who retired in 2016. Hiring two new faculty members would reduce our dependence on adjunct faculty and provide increased stability for the students and their academic needs.

We employ a large number of adjunct biology faculty. We need to develop a more efficient system for evaluating them. This has been an ongoing issue since the last program review.

We would like to increase the budget for part-time laboratory technicians. This increase would allow us to hire two additional technicians. These technicians would allow us to provide ample prep coverage for our labs and maintenance for faculty and students in those labs who are taking A and P courses.

We need to develop a policy or plan to implement in case our secretary is out of the department for an extended period of time. We need to have this plan in place *before* there is a need.

## Celebration and Recognition

[Awards, honors, special recognitions, ...]

Professor **Gerard Tortora**, is the senior author of *Principles of Anatomy and Physiology* (**14/e**, Wiley) and *Microbiology* (**10/e**, Pearson). Both texts are used at BCC as well as nation-wide and internationally. Both books are best-sellers in their respective areas and have been for many years.

Dr. **Robert Amitrano** is the author of *Laboratory Exercises in Anatomy and Physiology with Cat Dissection*, **8th ed** (Brooks/Cole/Cengage) and *Anatomy and Physiology Lab Manual*, **7th ed** (Brooks/Cole/Cengage) – Both publications are used in colleges around the country.

Dr. **Barbara Davis** was given a NISOD award for the 2016-2017 academic year. This NISOD (National Institute for Staff and Organizational Development) Excellence Award is given to recognize faculty who are committed to and promote excellence in teaching, learning and leadership at community and technical colleges. Professor Davis also received the John & Suanne Roueche Excellence Award for Bergen Community College in 2014 from the League for Innovation in the Community College.

Professor **John Smalley** received a Faculty Research/Scholarship Release Time Award. He was one of the fall 2015 recipients for his project *A Molecular Assessment of Local Biodiversity Employing Collection and Analysis of Environmental DNA (eDNA)*. This award has a 10 semester timeline.

During the last five years, Dr. **Charles Sontag** (2014), Dr. **Luis Jimenez** (2016), and Professor **Linda Wiles** (2017), received tenure.

Professors **Mary Flannery** and **Robert Dill** were promoted to Full Professor in 2016. Dr. Jimenez was promoted to Associate Professor in 2016. Professor **John Smalley** was promoted to Full Professor in 2015. Professor **Martha Lowe** was promoted to Full Professor in 2014. Dr. **Coleen Di Lauro** and **Elena Tartaglia** were granted their 4<sup>th</sup> Reappointments (out of 5 for tenure) in March 2017.

In 2016, we were granted a chapter the Biology Honor Society: Beta Beta Beta, the National Honor Society for Undergraduate Biology.  $\beta\beta\beta$  (Tri-Beta) is a National Honor Society for undergraduate students of Biology with chapters at colleges and universities nationwide.

In October 2013, Bergen Community College Department of Biology and Horticulture presented the 46<sup>th</sup> Annual Fall MACUB Conference. *Metropolitan Association of College and University Biologists* (MACUB). The Keynote address was given by Christoph Lengauer, Ph. D. Dr. Lengauer is the Chief Scientific Officer of Blueprint Medicines. Previously, he was vice president and global head of oncology and drug discovery and preclinical development at Sanofi. Dr. Lengauer is also a Howard Hughes Medical Scholar (HHMI). His address was entitled *The History and Bioethics of the Immortal Human HeLa Cell Line\**. Dr. Lengauer was a contributor to the book *The Immortal Life of Henrietta Lacks* by Rebecca Skloot. Recently, the book was made into a HBO™ movie *The Immortal Life of Henrietta Lacks* starring Oprah Winfrey and Rose Byrne. The entire department was involved in the production of the conference. The 2013 Conference Chair was BCC Associate

Professor **Robert Highley**. \*Information from the fall 2013 MACUB Conference Program, October 26, 2013.

One of our **BMEG/STEM** students, Joy Bochis, won first place for her work on Direct PCR Detection, Cloning, and Characterization of Mold Populations from Soils and Compost. Another one of our **BMEG/STEM/B2B** students Stephanie Zapata, won second place for her work on Direct PCR Detection, Cloning, and Characterization of Bacterial RubisCO Genes from New Jersey Soils. Their posters were presented at the 49th Annual Fall MACUB Conference October 29, 2016, SUNY, Old Westbury, NY.

Dr. **Judith Fitzpatrick** developed the Soil Biometer™ Test. The product was developed at Bergen Community College under a grant from the National Science Foundation (**NSF**). A provisional patent on the Soil Biometer™ was filed by the BCC Foundation in 2014.

### **Recommendations for Change**

[Internal to program, external to program, new opportunities, is additional data needed to effectively evaluate this program?, ...]

Due to the large number of BIO-101 *General Biology I* sections offered at BCC, we currently use two laboratories (S-306 and S-309) to handle the students. One of the laboratories, S-309 is used for both BIO-101 *General Biology I* and BIO-203 *General Biology II*. The sharing of S-309 for both classes has resulted in congestion regarding storage, display, and preparation for each classes' materials and equipment. We would like to open an additional laboratory to handle the additional BIO-101 sections that currently use S-309. This would benefit both students and faculty and decrease the amount of congestion. A new laboratory would also allow us to schedule more BIO-101 *General Biology I* and BIO-203 *General Biology II* sections, especially in the most popular time slots.

As previously mentioned, there is currently no form of **independent study** credit available for students who wish to obtain credits for scholarly class work outside of formal classes. During the last several years, we have reviewed this need and would like to develop a policy and financial structure that would allow students to obtain these credits.

## Action Plan

Program review is a means to an end, not an end in itself. Your final task is to develop a plan to improve the program.

[Identify 2-3 program goals and objectives for the future, improvements planned, changes taking place, responsible parties, timeframes, resource implications, etc....]

- 1) Goal: Increase Overall Biology Program (AS.NSM.BIO) Enrollment
  - a) **Objective:** Increase Overall Biology Department Enrollment
    - i) Timeframe: Five Years (2017-2022)
    - ii) Responsible Party(ies): Department of Biology Faculty and BCC Administration
    - iii) Resource Implications: Resources, both financial and nonfinancial, should be present in **three** areas: The Bergen Community College Administration, Regional Secondary School Districts, and the County Executive staff and Freeholders. Information from these three sources that would persuade Bergen County students to attend BCC is critically needed. This would allow students to consider attending BCC instead of in state four year schools or out of state schools that are quite expensive or popular but not really a good fit for these students.
  - b) **Objective:** Increase the Number of AS.NSM.BIO students
    - i) Responsible Party(-ies): BCC Faculty and Administration
    - ii) Time Frame: Five Years (2017-2022)
    - iii) Resource Implications: We would like to increase students receiving AS.NSM.BIO degrees by increasing the research opportunities available to students. This depends on available faculty to mentor students. Full time faculty are required since these research projects do not follow a set timetable and adjuncts have a limited time commitment to the college.
  - c) **Objective:** Increase the Number of AS.NSM.BIO.TECH students
    - i) Responsible Party(-ies): BCC Faculty and Administration
    - ii) Time Frame: Five Years (2017-2022)
    - iii) Resource Implications: We would like to increase students receiving AS.NSM.BIOTECH degrees by increasing program advertising in the local and regional vicinity and highlighting the research opportunities available to students. This depends on available BCC faculty and school counselors and Bergen County teachers to present this option to students. Several full time faculty are required since they teach the courses, have command of the biotech environment and career possibilities and they develop the research projects.
  - d) **Objective:** Offer **Independent Study** Credits
    - i) Responsible Party(-ies): BCC Faculty and Administration
    - ii) Time Frame: Five Years (2017-2022)
    - iii) Resource Implications: We would like to offer **Independent Study** credits to students for their work in the laboratory. Students would benefit from this type of experience and begin to learn how professional lab science actually develops. This also depends on available BCC faculty and school counselors and Bergen County teachers to present this option to students.

- 2) Goal: Increase the Number of Biology Courses offered on the Lyndhurst Campus
- a) **Objective:** Increase the Number of Full Time Faculty Members in the Department of Biology and Horticulture
    - i) Timeframe: Five Years (2017-2022)
    - ii) Responsible Party(-ies): Biology Department and BCC Administration
    - iii) Resource Implications: We would like to add at least two new full time faculty members to our department staff. We would like to be given the permission to advertise for full time faculty members in the Biology Department. We would like to advertise locally, regionally, and nationally. The resources would be provided by the BCC Administration. This would allow an increase in faculty members in Lyndhurst.
  
  - b) **Objective:** Increase the Number of Laboratories on the Lyndhurst campus
    - i) Timeframe: Five Years (2017-2022)
    - ii) Responsible Party(-ies): Biology Department and BCC Administration.
    - iii) Resource Implications: We would like to open a new lab on the Lyndhurst Campus. This would allow us to offer classes we presently do not offer in Lyndhurst. Funding would come from the BCC Administration. This would provide more space of our courses and would allow us to enroll more students in Lyndhurst.

# Appendices

## Appendix 1

### Library Instruction Classes in Biology and Horticulture

BIO 101/203 Researching Biology Topics - Review Articles  
BIO 101/203 Literature Search and Format Comparison - Lab Assignment  
Bio 103 Human Body  
Bio 104 Microbiology  
BIO 107 Intro to Human Biology  
BIO 108 Environmental Biology  
BIO 109/209 Anatomy and Physiology I and II  
BIO 130 People-Plant Relationships  
BIO 131 Botany (Plant Families, Plant Profiles, Biomes)  
HRT 102 Plant Science  
HRT 236 Horticulture Marketing & Sales  
HRT-232 Plant Propagation

## Appendix 2

### Department of Biology & Horticulture Laboratory Technician Duties

1. Laboratory technicians are expected to **CHECK IN** with every professor on the shift they are working to see if the correct lab is set up and all the needs for the scheduled lab experiment are met, including **ICE**.
2. Refrigerate **MICROBIOLOGY MATERIALS** before the 8 AM labs on Monday, Wednesday, Thursday, Friday, and Saturday. Lab gloves and a lab coat must be worn when working with microbiological materials.
3. Remove **DISCARDS** and incubate microbiological specimens after every microbiology lab. Discards include glass tubes in small wire baskets, as well as microbiological waste in small red biohazard bags and the large orange biohazard bag.
4. **AUTOCLAVE** microbiological waste regularly, usually first thing in the morning and whenever it accumulates. See Richard for instructions on autoclave operation.
5. Collect **DISPOSAL BAGS** from labs. Seal black bags with yellow tape and orange bags with biohazard tape. Laboratory gloves must be worn.
6. **IF AN EMERGENCY OCCURS IN ANY LAB OR PREP ROOM, TURN OFF GAS AND ELECTRICAL EQUIPMENT.**
7. Accept **MAILROOM** deliveries at 11:00 AM and 3:00 PM in S-224. Open and unpack perishables immediately and open and unpack other items when time allows.

8. Maintain **INVENTORY** of supplies and equipment in all prep rooms, storage closets, and cabinets to assure efficient ordering, tagging, and location of capital and other items.
9. Keep **CHEMICAL STORAGE** rooms clean and organized. Flammable chemicals and corrosive chemicals should be locked in their appropriate labeled safety cabinets. Flammable: yellow. Corrosive: blue.
10. Turn on **GAS** in S-205 and S-209 when needed; turn off gas when not needed. At night and after Saturday labs, turn off GAS and ELECTRICAL equipment.
11. Turn on **WATERBATHS** when needed and turn off when not needed. Check the level of WATER in the water baths weekly and fill with distilled water if water level is low.
12. Put the **FINISHING TOUCHES** on lab cleanups after every lab. Students are responsible for the major cleanup. If there are any labs that continually leave a mess, please contact the Department Chair. Clean side and front counters of lab rooms every day. Check **HOODS**.
13. Keep lab rooms **STOCKED** with lab supplies and equipment. Check and refill basic laboratory **SUPPLIES** such as soap, paper towels, etc...
14. Refill distilled water **CARBOYS** in lab rooms when needed from the S-224 and S-308 Millipore water distillers.
15. Turn on S-207 **ICE MACHINE** at least once a week and whenever the microbiology lab rooms (S-205, S-209) need ice. Please remember to turn off.
16. Sort Anatomy and Physiology **PREPARED SLIDES** in green boxes on a regular basis.
17. Bring **CATS** when needed into Bio 209 labs (S-221 and S-225) and remove when not needed.
18. Put **PACKING SLIPS** in basket in S-224 island counter.
19. Lock up **TABLETOP MUSCLE PEOPLE** models etc.... when no longer needed in lab rooms.
20. Remind professors there is no **EATING OR DRINKING** in lab rooms if it is seen. This is an **OSHA** requirement for laboratory and prep rooms.
21. **LABORATORY ROOMS:** S-205, S-209, S-212, S-217, S-221, S-225, S-306, S-309, S-312.
22. **PREP ROOMS:** S-207, S-208, S-210, S-211, S-224, S-308.

### Appendix 3

## BIOLOGY & HRT DEPARTMENT DISPOSAL PICK UP LOCATIONS



**PARAMUS 201-493-3755**



	ROOM	SIZE	COLOR	CONTENTS
Animal Materials	<b>A-008</b> (biohazard room on loading dock)	55 gal	Brown w/Blue label	Animal lab products
Biohazard Materials	<b>A-008</b> (biohazard room on loading dock)	30 gal	Brown w/Red label	Biohazard: fluids, tissues, containers
Chemical Materials	<b>S-210 - x3755</b>	30 gal	Blue	Iodine solution
	<b>S-211 – x3755</b>	30 gal	Blue	Formalin/Organic solutions
	<b>S-224A – x3755</b> (chemical storage room)	15 gal	white	Benedict's /Biuret solutions
	<b>S-308A – x3755</b> (chemical storage room)	15 gal 30 gal 30 gal	White Blue Blue	Catechol solution Iodine Solution Benedict's/Biuret Solutions



**LYNDHURST 201-879-8988**



Animal Materials	<b>LY-106</b> (Pick up room on 1 <sup>st</sup> floor)	55 gal	Brown w/ Blue label	Animal Lab Products
Biohazard Materials	<b>LY-106</b> (Pick up room on 1 <sup>st</sup> floor)	30 gal	Brown w/ Red label	Biohazard: fluids, tissues, containers
Chemical Materials	<b>LY-512 – x8988</b> (Lyndhurst Biology Prep Room)	15 gal 15 gal 15 gal	White White White	Iodine Solution Formalin/Organic Benedict's/Biuret Solutions

## **Guidelines for Writing the Report**

Your report should be a well-organized narrative describing and evaluating your program. Please use a traditional font and point size (such as Times New Roman 12) and number your pages.

Please be sure to check grammar, spelling, and dates. Your report will be viewed by others as representing the quality and integrity of your program.

Consider adding a glossary of terms if the report uses a number of acronyms or abbreviations that a general audience would be unlikely to understand.

Consider using appendices for survey results, audit reports, organization charts, forms, assessment instruments, samples of promotional materials, inventories, etc. Appendices should be numbered or lettered so you can direct readers to them in the body of the report.

## **Presentations at Public Forums**

Program reviews are presented to the college community in a public forum in the fall semester following the submission of the final report in May. Each presentation should last 20 minutes: 10-15 minutes for the presentation and 5 minutes for questions and answers. Academic program review team presentations are to include a brief introduction and the Summary and Action Plan from the academic program review report. A sufficient number of copies of the Summary and Action Plan needs to be reproduced (2-4 pages) for distribution at the public forum. You should not duplicate your entire report for distribution to the college community, although you may make it available electronically.

Team chairs are invited to use PowerPoint or another presentation software system to present program review highlights. You are also invited to produce videos, take photos, etc., for your team's presentation. Each team must rely on its own expertise and resources to produce a presentation.

Team chairs with special presentation needs (i.e., audio or video) must contact Media Services in advance of the presentation date. Team chairs who would like to practice their presentations in IRN120 need to make arrangements with Media Technologies.

For those team chairs using PowerPoint, Media Technologies will need to receive the presentation on a CD or a USB Thumb or Flash drive no later than the morning prior to the presentation date. Due to schedule constraints, Media Technologies will not be able to accommodate media brought by presenters the day of the forum.

New Jersey City University  
2039 Kennedy Boulevard  
Jersey City, New Jersey 07305

**1 July 2017**

It was my pleasure and privilege to serve as external reviewer for the 2017 program review of the Biology section of Bergen Community College's Department of Biology and Horticulture. The program review is defined by BCC as a process for self-evaluation and continuous improvement. It consisted of a prolonged fact-finding and analysis process, the preparation of a detailed written report, forecasting and goal-setting for the upcoming 5-year period, and a daylong site visit by an external reviewer. The site visit consisted of a tour of the Paramus facility led by Chairman Robert Highley; observations of classes in session; informal meetings with laboratory technicians, instructors and adjunct instructors; lunch with the department's faculty; and private meetings with Chairman Highley and Dean P.J. Ricatto and with Dean Ricatto and Provost William Mullaney.

My overall impression of the Biology program at BCC was very favorable. All Biology personnel are collegial, mission-centric, and student-focused; the technical support is excellent; the facilities are well organized, well purposed, well equipped, and well stocked; the observed students were all on task; the faculty and administrators were well informed and committed to the program's success and entirely reasonable in their expectations. The department participates in numerous grant-funded, community-service and outreach initiatives. It occupies a position of strength and prominence at the college. The program faces many challenges typical of public institutions of higher education in the U.S., namely enrollment and retention pressures, financial support and efficiency, adequate staffing levels, and the considerable day-to-day volume of instruction and support effort.

More specific consideration of the major sections of the self-study follow:

### **Mission and Program Goals**

The mission of the Department of Biology and Horticulture focuses on the attainment of knowledge of biology and the ability to think critically and communicate effectively. Although these goals are intuitive, they imply that the department works mostly toward the delivery of didactic information, which is both difficult to assess and probably not true, based on my observation of several very learner-centric classes. Furthermore, goals related to the development of inquiry skills and quantitative reasoning are omitted but these are probably occurring in current practice. Program goals are more expansive, but do omit some of the aforementioned elements.

**Recommendation:** Consider revising the department's and programs' goals and learning outcomes to consistently include elements of effective communication, scientific inquiry, quantitative reasoning, and other applications of acquired knowledge. The [AAMC-HHMI Scientific Foundations for Future Physicians](#) is a publication of the AAMC's Medical School Objectives Project that may prove helpful in shaping this revision.

## Progress & Grants

The department has a solid record of achievement in developing both the Paramus and Lyndhurst facilities. At this time, the Paramus facility operates very efficiently at close to its functional capacity and perhaps requires additional teaching space to expand its operations. The Lyndhurst facility, on the other hand, represents an opportunity to expand operations and achieve modest enrollment growth. The former strategy requires the recommitment of existing space by the dean and provost, while the latter strategy requires new or reassigned faculty to that location. Wireless network access and other technology considerations must factor into any planned expansion. The department has a remarkable record of achievement in attracting external funding for program-centric initiatives, as well as the development of facilities that support program success. The ability to attract outside support is both a testimonial to the strategic thinking by the department, dean and provost, and the quality of the proposals generated by BCC and its grants office. The importance of external support in the current, challenging fiscal environment cannot be underrated.

***Recommendations:** Carefully consider the opportunities for program expansion through increased space utilization in Paramus and Lyndhurst. Continue to aggressively pursue opportunities for external funding to leverage talent and initiative to support program goals. However, caution is advisable to not rely on external funding too heavily due to the questionable commitment of the federal government to sustain its support for its STEM and HSI initiatives.*

## Focus on Students

BCC's Department of Biology and Horticulture is highly student-centric and well operated and well organized to execute its educational mission. Its Biology and Biotechnology program enrollments have dropped off by about 5% from peaks in 2012, which may have been uncharacteristically high at that point in time. A similar trend is observed in overall enrollments in Biology classes, but these trends reflect recent enrollment drop-offs seen across higher education in the U.S. and are not necessarily indicative of local problems. Student satisfaction data are few and collection methodologies should be rethought. The Office of Institutional Research might help by providing information about graduates and transfers from the National Student Clearinghouse, for example. Student learning outcomes assessment data are currently being collected and initially analyzed. The assessment criteria directly align with the departmental goals, but no program-specific outcomes data are presented. Assessment of one learning outcome is reported, which indicates that students fell short of the benchmark for biological diversity. A modified assessment strategy is reported, but methodological modifications beg the question of why they are being undertaken: To improve the methodology or to improve disappointing results.

The department should pause to consider its overall assessment strategy, whether or not the departmental learning goals are changed. Several assessment methods can be implemented without creating a large amount of new work or introducing new curriculum and evaluation procedures. For example, instructors might employ common, embedded exam questions derived from course goals/learning objectives that are explicitly stated and emphasized in course sessions. Knowledge inventories can be administered in a pre-/post-test fashion to measure gains in factual

knowledge. Common lab reports, presentations or writing assignments may be assessed independently of the grading process to ensure that mission-derived learning outcomes are addressed. Faculty teams should look for appropriate assessments and artifacts that already exist before creating new assessments and encumbering themselves and students with additional work.

***Recommendations:*** *The department should proceed with caution in setting enrollment expectations that are unrelated to new program development. National and regional projections of collegiate enrollments predict slight, gradual decreases in high school graduates and college enrollments. Instead of setting goals exclusively for increased recruitment, emphasis should also be placed on retention efforts to maintain and increase enrollments. After a holistic review of the department's instructional goals and learning outcomes assessment, the department might consider including the assessment of scientific inquiry and quantitative reasoning skills.*

### **Focus on Faculty and Staff**

BCC's Department of Biology and Horticulture enjoys the services of a talented and dedicated faculty, staff and cadre of adjuncts who are collegial, mission-centric, and focused on providing high-quality and student success. The faculty are well engaged in professional scholarship and outreach activities, ranging from presentations at local symposia to the publication of numerous editions of best-selling textbooks. The program review document explores the demographic breakdown of the departmental faculty and reveals its challenges in recruiting and retaining women faculty members and faculty members of color. This challenge is a common one and one that is not easily solved. Discussions with the faculty in various venues reveal a desire to recruit additional faculty members to the department, and when such opportunities arise, every effort should be undertaken to ensure that the search committees employ strategies that ensure that the department attracts a diverse pool of applications. Demonstration lectures for students by female and underrepresented minority candidates conveys to students of diverse backgrounds that their interests are taken seriously and that the college recognizes the need to recruit instructors who reflect the demographic make-up of the BCC student body.

***Recommendations:*** *The department should make every attempt to recruit a faculty that reflects the demographic make-up of the BCC student body when the opportunity arises to recruit faculty members to the department. Efforts should also be made to ensure redundancy in the secretarial support that the department shares with the physical sciences. This individual is described as being a key member of BCC's science departments and her absences are felt acutely.*

### **Focus on Curriculum**

The A.S. in Biology program requirements are fairly orthodox and straightforward and serves students who intend to transfer to baccalaureate programs in the biological sciences well. The program has a strong and broad base in chemistry and math courses, and includes college-wide liberal arts requirements and electives. The A.S. in Biotechnology program requirements are partly similar to the Biology program requirements but includes program-specific requirements that prepare students for technical employment or transfer to baccalaureate programs in the

molecular biology. The Biotechnology program also has a strong and broad base in chemistry, math, and liberal arts courses. The program review document reveals that the department schedules its courses and offers its programs at a variety of times, in a variety of modes, at numerous locations, and in a variety of scheduling options. This is a very complex but highly successful undertaking and the department offers a significant portion of the college's courses and generates a significant portion of the college's revenue. The assessment methodology and results presented in the program review document emphasize the measurement of the mastery of concepts embedded in the department's 200-level courses, with the number of concepts assessed ranging from 3 or 4 to over 20 times. These courses appear to be advanced electives, but it would be helpful to clearly understand the roles played by the chosen courses in the curriculum. The method of applying the assessment questions is also unclear, but they are most likely questions embedded in final exams or other exams. The results indicate that fewer than 70% of BCC's Biology students achieve mastery of the assessed concepts.

**Recommendations:** *The department should review the [NJ Statewide Transfer and Articulation Agreement](#) and statutory limitations on credits in post-secondary programs in NJ and consider reducing its credit requirements, as appropriate. This can easily be done, but at the cost of eliminating elective credits that aid students transferring to BCC. It is also recommended that the department reconfigure its degree maps to place COM 100 Speech Communication earlier in the proposed curricula and to consider the elimination of Calculus as an elective, except for students transferring AP credit for Calculus. Statistics is a less rigorous but more useful course for most students, and Calculus is available as a 2- or 3-course sequence at 4-year institutions. Again, it is recommended that the department undertake a review of its program goals and learning outcomes and revise its assessment protocol and reporting to be simpler and more transparent. The data will be more meaningful and more helpful in "closing the loop" and making effective programmatic changes. Lastly, the inclusion of inquiry- and quantitative-skills assessment will afford the opportunity to include more performance-based assessments that are probably being assigned already.*

## **Focus on Support**

The Paramus campus facility is well organized, well equipped, and well stocked, which is a testimonial to the department staff, and faculty and the institutional commitment to the department's programs. The department's classes are small, which also reflects institutional commitment to the programs. The college's learner supports are professionally operated and popular, and its library resources are adequate. The department provides extensive offerings of lab courses, which generate quite a lot of lab-fee revenue. The program review document states that only about half of those revenues are returned to the department. Institutional policies for lab fee allocations were not explained or explored during my campus visit, but the document conveys the impression that the department finds fault with its lab fee return rate. It is not clear how the department's specific plans for spending the non-allocated funds are conveyed, but more specific elaboration of those plans and other needs may make a difference in the allocation process. Technology and technological support are areas of widespread dissatisfaction, and include the service provided by the college's IT department or contractor. It is entirely reasonable that the faculty and students at a successful college like BCC should enjoy modern computing resources and a robust network to allow for the use of multimedia applications and streamed content in

teaching and learning. Specific deficiencies are detailed in the program review document that should be explored and addressed. Perhaps non-allocated lab fees or technology fees might be drawn upon for this purpose.

**Recommendations:** *The department should pursue a focused discussion of the allocation of lab fees with the administration, identifying specific, unmet needs and opportunities that cannot be pursued for lack of funding. One of these is teaching and learning technology. A holistic assessment of both the current state of the department's technology and the added functionalities of improved technologies will make a strong case for further investment of those lab fees. The administration should give serious consideration to the department's technology needs, and perhaps those of the campus in general.*

### **Focus on Community**

The department participates in numerous community-oriented partnerships and outreach initiatives. Included in these are dual-enrollment agreements with 8 nearby school districts to offer collegiate biology courses in which high school students earn BCC credits. The department's community outreach initiatives are diverse, meaningful and enduring. Topics include organ donation, addiction and diabetes awareness, elder education, and UN global health initiatives, as well as departmental representation at open houses and STEM events. Members of the department and administration express disappointment at modestly decreased enrollments in recent years, while Biology enrollments at nearby 4-year schools have increased. NJCU is an example, as are Paterson, Ramapo and Montclair State, all of which have higher costs of attendance. The faculty and administrators feel that the college's image and reputation for excellence is weak in an affluent county. The department, however, can support its own success by maintaining and growing its presence in the community and by identifying successful alumni to show off as paragons of the BCC Biology brand. Another opportunity exists in the development of health-professional programming, which is identified in the program review document, though no plan for doing so is included. A third opportunity for elevating the department's image, if not the college's, is the formation of an advisory board. Though not required for accreditation or certification, independent perspectives are always insightful. A fourth opportunity exists in the establishment of independent study/research courses and internships. BCC developed a culture of student research through its grant-funded initiatives, and research scholars should be encouraged to pursue outside internships for further experiential learning.

**Recommendations:** *Maintain and expand community-oriented partnerships and outreach initiatives. New faculty are great sources of ideas for doing so. Focus on the department's image, both on and off campus. Establish an advisory board that includes key participants who can help to market the BCC and BCC Biology brands and bring new partnership ideas to fruition. Give serious thought to health-professions programming and internships, perhaps through advisory board employers.*

## Action Plan

The department presents an Action Plan with two goals, enrollment growth and development of the Lyndhurst campus. These goals are intuitive and details are provided that refer to outreach to school districts, increased student research activity, and staffing and facilities initiatives in Lyndhurst. Unfortunately, health-professions programming is not included in the planning, nor are retention addressed as a strategy for enrollment growth or any truly new ideas.

**Recommendations:** *The department should definitely proceed with the ideas it put forth in the Action Plan, but it should also act seriously on health-professions programming, which it identifies as the pathway to growing employment opportunities. This programming can be undertaken in conjunction with other departments and institutions that have existing programs in place for partnering or to serve as models. The department should also develop a retention strategy that leverages the college's existing learner supports and the department's student-focused initiatives (research, BBB, etc.) to support student success and continued attendance. Enrollment growth through recruitment of new students is unlikely over the next decades, but overall enrollments can increase by retaining more students already at BCC. Transfer workshops may be helpful in explaining the benefits of completing A.S. degrees before enrolling at a 4-year institution.*

## Summary

Overall, I was favorably impressed by the Biology program at BCC. The dedication of its faculty and staff was evident, and the facilities and their operation in support of the department's academic mission are remarkable, considering the volume of instruction that occurs throughout the year. The department's grant-funded, community-service and outreach initiatives are excellent and the college is to be commended for its ability to attract federal support in competition with state and research universities. The program's challenges are typical of public higher education in the U.S., and enrollment, financial and staffing pressures will exist in perpetuity. Therefore, the department should consider new, strategic initiatives to develop enrollment and pursue new partnerships to elevate its profile in the community. A few bold ventures, like its grant-funded projects, may have substantial impact.

Respectfully submitted,  
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