BRONX COMMUNITY COLLEGE AND THE CITY COLLEGE OF NEW YORK
OF
THE CITY UNIVERSITY OF NEW YORK

PROPOSAL FOR A JOINT PROGRAM
BIOTECHNOLOGY, ASSOCIATE IN SCIENCE (A.S.) DEGREE
BIOTECHNOLOGY, BACHELOR OF SCIENCE (B.S.) DEGREE

EFFECTIVE FALL 2013

TO BE OFFERED JOINTLY BY
BRONX COMMUNITY COLLEGE AND THE CITY COLLEGE OF NEW YORK

SPONSORED BY
THE DEPARTMENT OF BIOLOGY AND MEDICAL LABORATORY TECHNOLOGY
AT
BRONX COMMUNITY COLLEGE
MARTIN FEIN, PH.D., CHAIRPERSON

AND

THE DIVISION OF SCIENCE AT THE CITY COLLEGE OF NEW YORK
CHRISTINE LI, PH.D., ACTING DEAN

APPROVED BY

BRONX COMMUNITY COLLEGE GOVERNANCE (College Senate December 17, 2012)

CITY COLLEGE OF NEW YORK GOVERNANCE (CLAS December 6, 2012)

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I. ABSTRACT

Bronx Community College (BCC) proposes to establish an A.S. degree in Biotechnology. This will be part of a joint program with City College of New York (CCNY), which will lead to students ultimately obtaining a B.S. degree in this field.

The goal of this program is to equip BCC students with a firm understanding of the fundamental theoretical concepts and the basic hands-on skills necessary to achieve optimum performance in this field and facilitate extension of their knowledge base in advanced courses. Toward that end, BCC has used part of a US Department of Education grant to setup and equip a biotechnology lab equivalent with the biotech labs at CCNY to provide a solid introduction to the essential techniques of this field. These will serve as the foundation for the more advanced techniques that the students will receive in their coursework at CCNY. Due to demands for trained personnel in biotechnology, recent Department of Labor statistics are projected to need more workers than are currently enrolled in education and training programs. This program will address the shortage in this rapidly growing field while increasing the number of qualified minority students in this scientific area.

II. PURPOSE AND GOALS

The Biology Department of Bronx Community College and the Division of Science of the City College of New York propose to establish a Joint degree program in Biotechnology. BCC graduates of the Biotechnology A.S. program will continue their studies at CCNY where they will earn a Bachelor of Science (B.S.) degree in Biotechnology. Creation of this 2 + 2 partnership in Biotechnology will establish new opportunities for students to receive a solid, affordable education leading to a career path in biotechnology, which is applicable in academic, medical, or pharmaceutical areas. Graduates of the associate in science degree in this field will be trained in the fundamental techniques of molecular biology that form the basis of research used in the field of biotechnology. This will allow them, under the appropriate supervision, to study and manipulate the fundamental molecular aspects of life to be used in drug research and design, molecular diagnostics, and in cancer research and diagnostics.[1] This foundation will ensure students' success at CCNY as they continue on to advanced courses.

Biotechnology laboratory facilities, at BCC and CCNY, were established and updated with funds from a collaborative Department of Education grant. These labs will provide equal educational opportunities for biotech students including the ability to learn the techniques of biotechnology at BCC and extend them at CCNY. This proposal strengthens the institutional frameworks needed to produce STEM Associate degree holders at BCC and to bring them to successful Bachelor degree attainment at CCNY.

Numerous national studies highlight the need for underrepresented minorities to engage in careers in the sciences: "Although minorities are the fastest growing segment of the population, they are underrepresented in the fields of science and engineering" (Expanding Underrepresented Minority Participation, Committee on Underrepresented Groups and the Expansion of the Science and Engineering Workforce Pipeline; Committee on Science, Engineering, and Public Policy; Policy and Global Affairs; National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 2001). Furthermore, the number of individuals from economically disadvantaged backgrounds with advanced degrees in the biological sciences who work in biotechnology, and the pharmaceutical industry are also very low. By having a joint program between BCC and City College, we will ensure that this population of students (which make up the majority of BCC students) makes a smooth transition from a community college to a four-year college. Faculty members at both institutions are active researchers with demonstrated expertise to provide the mentorship and training for these students. The program name is widely recognized by the general population and provides an accurate description of the curriculum.

As published in the BCC college catalog: "The primary mission of Bronx Community College is to provide a strong academic foundation for students of diverse backgrounds, preparations and aspirations in order to further their success in their chosen vocations, their future education, and their community involvement. To achieve its mission, the College maintains high standards of instruction to meet the learning needs of every student." Within that responsibility and

[1] Some of the specific techniques are listed in the Curriculum section of the Proposal on page 11 and are practiced by students in the BIO XX course, Cell and Molecular Biology with an Introduction to Biotechnology. They syllabus of this course is listed on page 28.

obligation, BCC develops and provides access to quality programs, instruction and support services. Further, the college fulfills its commitment to maintaining a leadership role in scientific, technological and professional programs. BCC participates in CUNY-wide science programs, such as Alliance for Minority Participation (AMP), funded by the National Science Foundation.

At CCNY many courses in several departments teach different aspects of biotechnology. By its very nature, biotechnology is not one discipline, but the interaction of multiple disciplines. By making the B.S. component of this program interdisciplinary, we can expose the students to a multi-faceted approach to questions in biotechnology. The Biology, Chemistry, and Physics Departments have many active research laboratories in biotechnology and, as such, City College is an excellent campus for such a program. The City College and Hunter College currently offer MA degrees in Biotechnology. The City College and York College also offer BS degrees in Biotechnology. Because the students have required research credits, they must not only satisfy the laboratory component, but as part of the course requirements, they will also be submitting papers on their research projects. The combined hands-on experience and their training in scientific writing will uniquely prepare the students for their future careers, whether that is in medicine, biotechnology, pharmaceutical industry, or academic research. Furthermore, this program plays to the strengths of City College; namely, City College is well-known for its research prowess in the sciences and for its large number of research labs. Students in the proposed program will be uniquely positioned to choose among many active research labs represented by three departments for their research projects. The partnering with City College will allow BCC students to take advantage of these benefits.

III. NEED AND JUSTIFICATION

Over the last several decades, there has been a series of major breakthroughs in the area of life science and biotechnology in particular.[2] Advances in biotechnology are creating a vast array of biomedical and pharmaceutical products and discoveries for improving human health, relieving human suffering and increasing the quality of life for citizens in the United States and around the world. Although the United States is presently the preeminent global leader in the biotechnology industry, its capacity to maintain this competitive advantage is seriously being undercut due to the limited availability of qualified technicians and scientists being produced by our colleges and universities. This fact is true not only in biotechnology but across all areas of engineering and science. [3]

Just when the U.S. biotechnology industry requires more scientists and technicians, a large pool of potential workers continues to be isolated from careers in the field. Hispanic and African-American minorities of both sexes account for only an exceedingly small proportion of the scientific workforce. *"A public partnership involved in workforce development among the scientific disciplines will be the single most important challenge confronting the higher*

[2] Glenn, Jerome C. Gordon, Theodore: Views from the Millennium Project on the Future of Technology with Implications for Society and the United Nation's System. Tokyo, Japan, January 19-21, 2000. p.5

[3] http://www.nsf.gov/statistics/nsf99338/access/c3/c3s7.htm

education community over the next decade."[4] Increasing the supply of workers in science and technology by developing a pool of talent that reflects the population diversity is the key to success in this area. We must broaden participation in biotechnology occupational areas through the inclusion of minority students.

Biotechnology is one of the most rapidly expanding fields at the forefront of recent scientific advances. Positions for Biotechnicians are expected to grow by 28.2 % between 2004 and 2014, while the occupation of biological scientists is projected to grow by 17.0 % (U.S. Bureau of Labor Statistics, National Employment Data).[5] Scientists working in research and development use biotechnology techniques in biomedical engineering, environmental science, virology, forensic science, gene therapy, microbiology and the production of genetically engineered food and drugs. To succeed and grow in the 21st century economy, biotechnology employers will need to fill a wide range of positions in their companies – from entry-level to the most advanced – with qualified and skilled individuals. The U.S. Department of Labor has recently noted (1/12/09) that because the biotechnology industry is experiencing such rapid growth, biotechnology firms often demand more skilled workers than are available and are projected to need more workers than are currently enrolled in education and training programs.[6] Biotechnology is among the most active research fields; biological scientists working in pharmaceutical or biotechnology companies form the core of the research operations in the industry (US Department of Labor, Bureau of Statistics, Guide to Industries, 2010-2011 Edition).

Locally, biotechnology remains one of the employment growth areas. In 2003, the biotechnology and pharmaceutical industries in the New York employed 54,469 people and New York ranked sixth in the number of biotechnology companies; 10 incubators and science parks, including one at SUNY Stony Brook, have been built in the state and 11 more are in development, including one at SUNY Downstate (Hevesi, A.G., Bleiwas, K.B. "The Economic Impact of the Biotechnology and Pharmaceutical Industries in New York", Report 11-2005). Forbes Magazine (K. Dolan, June 7, 2004) indicated that "Biotechnology has become the must-have industry for a growing number of U.S. states, with its promise of high-paying jobs and potential future growth".

The proposed program meets the needs of many important constituencies. While some Biology and Chemistry majors decide to pursue a medical or doctoral degree, many of our students join the workforce more immediately. The existence of this program will offer increased opportunities for employment in professional careers to undergraduates graduating from City College; these career opportunities include entry-level positions in biotechnology and pharmaceutical companies. Our students, particularly those from underrepresented populations, should be able to take advantage of these opportunities. In addition, we anticipate that our graduates will be fast-tracked into graduate programs in the sciences due to the research experience that they gain in our program. Students graduating with a BS in Biotechnology and

[4] Building Engineering & Science Talent (BEST): A Bridge for All: Higher Education Design Principals to Broaden Participation in Science, Technology, Engineering, and Mathematics, February 2004. p.6

[5] U.S. Department of Labor, High Growth Industry Profile: Biotech Industry Forecast, http://doleta.gov/BRG/Indprof/Biotech_profile.cfm

[6] U.S. Department of Labor, Employment and Training Administration, January 12, 2009.

taking a Biological Technician position have an average mean salary of $44,730 (US Department of Labor, Bureau of Labor Statistics, 19-4021 Biological Technicians, May 2009).

In an effort to meet New York State and City's workforce needs, a number of colleges have initiated programs in biotechnology. At the present time within the New York City Metropolitan area, Columbia University, Cornell University, New York University, York College and Hunter College offer postsecondary degrees in biotechnology or related fields. Due to the recent growth within this industry there has been a major shift in the type of workers needed to fill critical skill gaps. Today the industry needs skilled personnel whose educational level ranges from an associate's degree to a doctoral degree. Therefore, there exists a critical need for community colleges like BCC to provide this type of education at this point in time, since there are not enough entry points to train workers to meet the projected workforce demand. This is especially true for underrepresented minorities that are served by BCC.

This proposal has two unique features. Firstly, it specifically targets an underrepresented student population for access to a profession with high growth employment opportunities in this diverse field. Secondly, the interdisciplinary design of the component of the program at CCNY plays to the research strengths of its science faculty and prepares its graduates for the diversity of applications in this field.

IV. STUDENTS

Minority persons living in the Bronx comprise our target population. A majority of our students are first generation college students, returning students, veterans and workers seeking new career opportunities in a changing economy. College enrollment has increased in recent years. The enrollment of 11,669 students (Spring 2012) at BCC reflects an increase of 31% over the past 5 years. Approximately 1,000 students are enrolled in science, technology, engineering and mathematics. The ethnic and socioeconomic composition of the student body is similar to that of the surrounding region. Approximately 61% of the students are Hispanic/Latino, 33% African-American, 3% Caucasians and 2% Asian/Pacific Islanders. In addition, approximately 58% of BCC students are female. Students are often foreign born and approximately 80% are the first in their families to attend college. Most of the students at BCC, whose average age is 26 years, are older than the average college student. In addition, many are single parents from low-income households.

A. Interest and Recruitment

A spring 2009 survey of 138 students in General Biology I and II at BCC, indicates that 65% of them would be interested in enrolling in a biotechnology program. Of the 138 respondents, only 18% were Biology majors and 82% were Liberal Arts and Science majors. This indicates that there is a pool of students already at BCC who are potential candidates for this program. Additionally, 65% of respondents said they would go on to earn the B.S. degree and 55% indicated an interest in a graduate degree in this area. These figures indicate that, if provided with the opportunity, students would make this a robust and sought after program. This result is consistent with studies across CUNY that over 50% of internal transfers to STEM

majors come from majors in other fields of study. A biotech program at BCC would simultaneously meet both workforce and student needs. The survey is shown below.

Biotech Questionnaire

Background information

Biotechnology is a collection of technologies that use living organisms to investigate life processes, disease processes and to make useful products. Examples include cloning genes, investigation of gene products, design of drugs and therapies, agriculture, forensic science and environmental science. It is a rapidly evolving field, job growth in this industry is approximately 28.2% (from 2004-2014). The industry employed approximately 814,000 workers in 2007, publicly and privately held biotech companies in the U.S. earned combined revenues of 50.7 billion dollars. The average salary for a technician with an A.S. degree is approximately $35,000, and B.A.'s about $45,000 plus health benefits.

BCC is attempting to implement a Biotechnology curriculum which will articulate with CCNY, so that there are A.S. and B.S. degrees awarded.

[1] U.S. Department of labor- High Growth industry profile: Biotech Industry Forecast http://www.doleta.gov/BRG/indprof/biotech_profile.cfm

To assess student interest, please answer the following questions:

		Yes	No
1	If BCC had such a program, would you be interested in this curriculum?	65%	35%
2	After completing the A.S. degree at BCC, would you seek employment in this area?	57%	43%
3	Would you go on to the B.S. Degree?	65%	35%
4	Would you be interested in going on to graduate work in this area?	55%	45%
5	Are you a Biology Major?	18%	82%

Based on 138 student respondents, from Bio 11 & 12 Spring 2009 Semester.

B. Projected Enrollment

The estimate for the number of students in entering cohorts is a reflection of the interest in the program from the survey responses. In addition, recent history of enrollment into other Joint Degree programs at BCC with other units of CUNY shows that robust growth since their inception is expected due to strong student interest. For example, the Science for Forensic A.S/Forensic Science B.S. program between BCC and John Jay College has increased from 49 students at its initial offering to 101 in a space of three years. The Dietetics and Nutrition A.S/Dietetics, Foods, and Nutrition B.S. program between BCC and Lehman College has grown from 67 to 258 students in the five years since its inception. The Liberal Arts and Science,

Biology Option has increased from 75 students to 153 students in the space of five years. These data support our enrollment projections indicated in table 1.

Enrollment estimates in the AS/BS program for the first five years are given below in Table 1.

Table 1. Projected Enrollment

Institution	Students	Year 1		Year 2		Year 3		Year 4		Year 5	
		New	Cont.	New	Cont.	New	Cont.	New	Cont.	New	Cont.
Bronx Community College	Full-time	16	0	16	11	16	18	16	21	16	22
	Part-time	16	0	16	11	16	20	16	26	16	29
City College	Full-time	0	0	0	0	2	0	6	2	7	6
	Part-time	0	0	0	0	0	0	1	0	2	1
Total		**32**		**54**		**74**		**88**		**99**	
Total FTE		**24**		**41**		**54**		**67**		**75**	

The numbers are calculated as follows: Entering cohorts will be of 16 full-time and 16 part-time students with about 40% of students transferring in with advanced standing. A large percentage of incoming freshmen will require remediation in at least one of the three areas of reading, writing and mathematics. This will increase the normal time of progress of full-time students from four to five or six semesters. BCC students will begin transferring to CCNY by year four. The attrition rate for each cohort is estimated to be 40% for the first year and 20% thereafter. These estimates are equal to college-wide statistics over the last three years at Bronx Community College.

C. Admission Requirements

Upon declaration of the A.S. major at Bronx Community College and upon admission into the BS program at the City College, each student will be assigned a faculty advisor, who will guide the student through his/her coursework at BCC and help the student find a research mentor at City College. To graduate from the A.S. program at Bronx Community College, students must satisfy course requirements as well as college-wide graduation requirements. Students who successfully complete the AS in Biotechnology degree will be accepted into the City College BS program provided they have a 2.75 GPA in the sciences. To make the transition as seamless as possible, BCC students in their last semester will meet with advisors at City College and register

for their lower junior semester courses, along with their counterparts who started the BS in Biotechnology degree at City College. This early registration will assure them access to the necessary courses.

Students who do not progress to the baccalaureate component at the City College of New York will be advised to change their academic program to the Biology option of the Liberal Arts and Science Associate in Science. These graduates can transfer to baccalaureate programs in biology elsewhere. In particular, Bronx Community College has an articulation agreement with Lehman College for the Biology option in Liberal Arts and Science and both the Biology B.S. and Anthropology B.S. programs. Most of our current graduates in the Biology option take advantage of these articulation agreements and transfer to Lehman College.

V. Curriculum

Bronx Community College

The specific goal of the AS program is to equip BCC students with a firm understanding of the fundamental theoretical concepts and the basic hands-on skills necessary to achieve optimum performance in this field and facilitate extension of their knowledge base for advanced courses at City College. The program's goal is to provide practical hands-on education, training and familiarity with the latest laboratory techniques, and equipment, as well as a sound understanding of the theoretical principles involved in these techniques. Students will gain a wide variety of skill sets and techniques through both classroom lectures and laboratory learning experiences. The skill sets will include the following:

- Molecular Cloning Methods
- Sterile Techniques
- Preparation of Solutions and Media
- Polymerase Chain Reaction (PCR) Techniques
- Use of Cloning and Expression Vectors
- Molecular Separation Techniques
- Tracer Methodology
- Nucleic Acid Hybridization
- Restriction Enzyme Digestion & Mapping Techniques
- Assaying DNA-Protein Interactions
- DNA/RNA Sequencing Techniques

The curriculum also provides a strong foundation in a variety of mathematics and science courses as well as general education courses. Table 2 below lists the course requirements for the curricula at both Bronx Community College and the City College of New York.

The City College

No new courses will be created *per se* for the program at CCNY, but existing courses from multiple departments will be combined to create a unique interdisciplinary program. Furthermore, this degree program will be unique in **requiring** that students perform scientific research, an integral part of biotechnology.

Coursework at City College will build on the basic foundation in the sciences from BCC. This coursework will be reinforced by training in a research laboratory where students will perform scientific research. Research will focus on a scientific discipline that incorporates the methodologies and skills necessary for applications in biotechnology. With the proposed joint AS/BS degree in Biotechnology, students will have increased career options, including preparation for graduate and medical schools and entrance into the job market. As indicated above, New York is a biotechnology center that needs well-trained and qualified staff. Department of Labor projections indicate that to remain globally competitive in the science and engineering fields, the need for more skilled workers in biotechnology than are currently enrolled in education and training programs must be addressed (US Department of Labor, Employment and Training Administration, Aug. 25, 2008).

A. Course Requirements

Table 2 below lists the courses required for the A.S. and B.S. components of the program.

Table 2. Curriculum: Required and Elective Courses

Courses at BCC			
	Number of credits		**Prerequisites**
	Common Core	**Specialization**	
Common Core	**30**	**30**	
Required Core A	6		
Required Core B: MTH 31*	3	1	MTH 30
Required Core C: BIO 11**	3	1	
Flexible Core A	3		
Flexible Core B	3		
Flexible Core C	3		
Flexible Core D	3		
Flexible Core E: BIO 12**	3	1	BIO 11
Flexible Core A-E	3		
BIO 55 Genetics		3	BIO 12
BIO XX*** Cell & Molecular Biology		4	BIO 55
CHM 11 General College Chemistry I		4	
CHM 12 College Chemistry II		4	CHM 11
MTH XX*** Elements of Calculus & Statistics		4	
PHY 11 College Physics I Or CHM 31 Organic Chemistry I^		4-5	CHM 12
MTH 30 or **Free Electives**^^		3-4	
Total	**60**		
Courses at City College			
Required Biology Course	**5**		
BIO 48300 Laboratory in Biotechnology	5		BIO XX (BIO 22900 equivalent)
Required Chemistry Courses	**6-11**		
CHEM 26100 Organic Chemistry I*[If not taken at BCC]*	3		CHEM 11
CHEM 26200 Organic Chemistry Laboratory I*[If not taken at BCC]*	2		CHEM 11 & CHEM 26100; coreq. CHEM 26300
CHEM 26300 Organic Chemistry II	3		CHEM 26100
CHEM 45902 Biochemistry I	3		CHEM 26300
Required Physics Courses	**4-8**		
PHYS 20400 General Physics OR PHYS 20700-PHY 20800	4-8		PHY 11 *[if PHY 11 taken at BCC]* If taking CHEM 33500 as a Science Elective

Required Ethics Course	**3**	
ENGR 30000 Impact of Biomedical Technology OR PHIL 34903 Applied Ethics: Medical Ethics	3	ENGR 30000: SOC 10500 or ANTH 10100 or ECO 10000 or PHIL 34903 or honors liberal arts course
Required Research Courses†	**6**	
BIO 31000 (or BIO 30100-30300) OR CHEM 31001-31004 (or CHEM 30100-30400) OR PHYS 31000 (or PHYS 30100-30300)	6	Must apply for acceptance. Different departments have different GPA requirements
Science Electives	**11**	
SCI 28000 Bioinformatics &Biomolecular Systems	4	BIO 10100 & 10200 OR CHEM 10301 & 10401; co-req: BIO 20600
BIO 35000 Advanced Microbiology^^^	4	BIO 22900
BIO 35500 Introduction to Scientific Literature using CREATE	4	BIO 20600 or BIO 22900
BIO 37500 Developmental Biology	3	BIO XX
BIO 38000 Eukaryotic Genetics	4	BIO 22800 & BIO 22900
BIO 41000 Cell Development & Cellular Senescence	3	BIO 22900
BIO 42000 Virology	4	BIO 22900 & BIO 35000
BIO 42500 Cancer Biology	4	BIO 22900
CHEM 33500 Physical Biochemistry	5	CHEM 24300, CHEM 26300, & CHEM 33000
CHEM 40600 Environmental Chemistry	3	CHEM 24300 & CHEM 26100
CHEM 48005 Biochemistry II	3	CHEM 45900
PHYS 31500 Medical Physics	3	PHYS 20400 or PHYS 20800
PHYS 42200 Biophysics	3	MATH 202 or MATH 209 AND PHYS 20400 or PHYS 20800
PHYS 52200 Biomedical Physics	3	PHYS 42200
Common Core College Option‡	**6**	
General Electives	**14-15**	
Total	**60**	

* Students are strongly advised to select this course from among the options in this Required Area. MTH 31 is a 4-credit course. Three credits will count towards the Common Core –Required Area B and one credit will count toward the program specialization requirement.

** Students are strongly advised to select theses courses from among the options in the respective Common Core Areas. BIO 11 and BIO 12 each are 4-credit courses. Three credits for each will count towards the Common Core – Required Area C and Flexible Area E, respectively. The additional 2 credits will count toward the program specialization requirement.

***These are new courses; the course numbers await Chancellor's approval.

^CHM 31 is recommended for students who opt to take BIO 33500 at CCNY.

^^Students that are required to take MTH 30 can only select PHY 11 so as not to exceed the 60 credit limit for the A.S. degree program.

^^^The name of Bio 35000 is being changed from Microbiology to Advanced Microbiology (please see April 2011 Chancellor's Report).
†For students with a Biology GPA of 3.5 or higher, they should take the Honors Research sequence BIO 301-303 instead.
‡The College Option requirement for baccalaureate programs is 6 credits for students transferring with an A.S. degree as per the CUNY Board of Trustees Resolution of June 27, 2011 (B.I.14 - RESOLUTION ON CREATING AN EFFICIENT TRANSFER SYSTEM)

The course descriptions of required courses in the table above are listed in Appendix A at the end of this document. Appendix B contains syllabi of the two new courses in the program at Bronx Community College. A sample semester-by-semester course sequence is listed in Appendix C.

B. Program Administration

Bronx Community College
The AS degree portion of the joint program will be administered through the Biology department at BCC. A faculty coordinator will monitor the academic progress and provide advisement to students in the program.

The City College
Because the BS degree will be interdisciplinary and not centered in a department, the degree will draw its administrative structure from the three major participating departments: Biology, Chemistry, and Physics. An executive committee of five faculty members will be in charge of running the program. The executive committee will be composed of three members from Biology, one member from Chemistry, and one from Physics. If the interest areas among the students shift, the composition of the executive committee will be changed accordingly. The office of the Dean of Science will provide administrative support for the program. All members of the Biotechnology faculty, however, are expected to advise students on coursework.

Faculty from BCC and CCNY will meet quarterly to maintain the quality of the program by reviewing the curriculum in light of developments in the field, reviewing student progress at both institutions and enhancing the level of academic support services for students as they move from one institution to the other.

Even after declaring Biotechnology as a major, students will continue to be advised by the City College Academy of Professional Preparation (CCAAP) office, which is run by Dr. Millicent Roth. Besides their advising duties, the CCAAP office also provides tutoring services, peer-to-peer mentoring, and advice in navigating City College. In addition, CCAAP sponsors career panels, Parents' dinners, and other activities, many of which play an integral part in retaining students. In addition, all students will be advised by a member of the Biotechnology faculty for his/her remaining time at City College.

VI. Cost Assessment

A. Faculty

Bronx Community College

The faculty members of the Department of Biology and Medical Laboratory Technology are well qualified and experienced in teaching the biology courses in the Biotechnology program. There are 20 full-time faculty and five full-time technicians appointed in the department. Sixteen faculty members have earned Ph.D. degrees. Six faculty members have practical experience in biotechnology research. These members will serve as the core members for the program.

Given the present number of offerings in the department and the commitment of full-time faculty to teaching and research, it is anticipated that the department will appoint adjunct faculty to support its offerings as it expands into biotechnology. Initially, no new full-time faculty is needed to be hired for the program. It is anticipated that one additional adjunct faculty member will be added each year as the program develops. It is possible that as the enrollment grows that there will be a need for an additional full-time faculty member in the fifth year of the program. It is also anticipated that as the enrollment grows that there will be a need for an additional part-time technician to support the new course.

The City College of New York

The faculty members needed to teach courses at City College for the Biotechnology program are already available in the Biology, Chemistry, and Physics Departments; all faculty members with the professorial rank in these three departments have doctoral degrees and are full-time tenured or full-time tenure-track. All students are required to perform research; hence the limited number of research slots in a laboratory could hamper the growth of the program. To increase research capacity for students, candidates with a background in biotechnology will be sought for new faculty positions in these three departments. In addition, City College has a partnership program with Memorial Sloan Kettering Cancer Center (MSKCC) that is directed by Prof. Karen Hubbard. Hence, the MSKCC partnership offers additional laboratory opportunities for our students. Thus far, with the exceptions of Kamilah Ali, who started Fall 2010, and Mark Emerson, who started Fall 2012, all of the faculty members listed below are funded with external research grants and we expect that they will be similarly funded in the future. Appendix D lists the names of the faculty teaching biology courses at Bronx Community College and required science courses at the City College of New York.

B. Facilities and Equipment

The Department of Biology at BCC has adequate classroom and laboratory space to meet the needs and demands of the proposed course of study. Instruments and other scientific apparatus from our well-equipped biology laboratories will be available to students enrolled in the biotechnology program. We have in place 8 biology labs, one of which will be converted into a specialized biotechnology lab.

Profs. Luis Montenegro and Martin Fein at BCC and Millicent Roth and Christine Li at City College at CCNY were co-PIs on a Department of Education grant, which provided funding to purchase equipment for a dedicated lab for the Cell & Molecular Biology course at BCC and to upgrade equipment in current biology courses with cell and molecular biology components at City College. Monies from this STEM grant in the sum of $196,228.00 have been used to purchase special equipment to fully equip this new biotechnology laboratory at BCC. In addition, the Department of Biology has a computer laboratory for its students, which is located on the sixth floor of Meister Hall. This lab is available for use in the biotech program.

Because the program at CCNY uses current courses from multiple departments to form the basis of the program, the inception of the program at City College will not require any additional facilities or equipment. However, as the Biotechnology program grows (e.g., when the program has 10-15 students enrolled in the B.S. component), we will need to add more sections to some of the courses; at that time, more equipment and supplies will be needed as well as graduate student adjuncts to help run the sections. Prof. Li or other members of the Biotechnology Advisory Committee will continue to submit educational grants to the Department of Education and National Science Foundation to help defray some of the equipment costs.

C. Library and Instructional Materials

BCC Library's print collection consists of over 100,000 volumes. The BCC Library occupies approximately 15,300 square feet. Students, faculty and staff have circulation privileges at all of the CUNY libraries (with exception of the Graduate Center), and access to more than 7 million books in CUNY collections. InterLibrary loan services are available to BCC students as well as faculty, and items not available as local holdings may be obtained on loan from other libraries as needed. The Library offers document delivery services, a commercial service with fast turnaround for article delivery, to faculty in support of their research needs.

The Library's 327 periodical print subscriptions are supplemented by more than 39,000 full-text electronic journals, 838 electronic books, 105 full text electronic databases and 22 index and abstract databases. The Learning Resources Center collection includes more than 3,700 titles, in multiple formats (films, slides, film strips, tape recordings, videocassettes, CD-ROM's, and DVDs). Electronic sources are available 24/7, and 99% of the sources are licensed to permit users to also have access from remote sites off campus.

Most of the needs of Science Division faculty at City College are online scientific journals. City College currently has sufficient online scientific journal subscriptions to satisfy this program's needs; there are no additional costs to the library with the additional students using the online subscriptions.

A five-year projection of resources needed to offer the programs to the estimated number of students enrolled at both institutions is attached in Appendix E.

VII. PROGRAM EVALUATION

BCC has currently in place an institutionalized processes for evaluating the effectiveness of existing degree programs, which are also appropriate for assessment and evaluation of new degree programs such as Biotechnology. Consistent with this policy, like all other academic programs at BCC, the proposed Biotechnology program will go through a self-study and external evaluation via the college's academic programs and review process. New guidelines and protocols for academic assessment and review feature direct evidence of student learning in departmental programs and courses. The Institutional Research Department at BCC conducts and distributes annual reports that describe in-detail program effectiveness to the departmental Chairpersons and the Vice President of the Academic Affairs. Individual degree program reports include enrollment statistics, number of graduates, two-year graduation rates, transfer, program persistence and college attrition rates by gender and race/ethnicity. This type of data is critical in the analysis and evaluation of the Biotechnology program during its first few years.

The same processes for direct and indirect assessment of student learning that are in place at the college will be used in the evaluation of students in the new Biotechnology program. In addition, the college administers an annual Assessment of Student Learning Survey of individual courses in which students are asked to rate their perceptions of what they have learned in the course. The department chair and individual instructors are provided with survey results that allow them to compare their sections with overall departmental results for each course, and courses taught in the program/department and the college. The department and faculty may then revise individual courses based on these assessment results.

These previously institutionalized assessment and evaluation processes insure the framework for a complete evaluation of all new programs designed, developed, implemented and institutionalized at BCC.

The main objectives of the program evaluation are: (1) to document, interpret, and assess student, faculty, and institutional outcomes; (2) to compile evidence of how the program activities/components have led to specific improvements in classroom instruction and learning outcomes, student/faculty engagement and satisfaction, student retention, and degree attainment; and (3) to demonstrate how assessment activities and their results, in turn, are utilized to make mid-term corrections.

In particular, the evaluation design will measure the extent to which program efforts are linked with measures of engagement and capacity, as well as the extent to which these measures are linked with student success measures (retention, credit accumulation, GPA, course success, and degree attainment). Engagement will be measured by survey data reflecting students' reported attitudes. Capacity will be measured by specific performance benchmarks, such as course passing incidences, credit accumulations, and grade point averages. It is expected that this systemic approach will result in increases in student enrollment, retention rates, and graduation rates.

The evaluation design will include formal assessment at different points in time, with equal weight given to formative and summative evaluations. Formative evaluations will provide for

mid-course corrections and on-going program improvement, based on programmatic feedback and interview with faculty and student participants. Summative evaluations will occur at the end of each academic year to determine if specific objectives and benchmarks have been met.

The specific goals of this program are to increase student awareness in a new major and the opportunities in the work place after graduation. In addition, the program should have a seamless transition between BCC and City College. Faculty advisors on both campuses will be actively monitoring student progression through the program.

The program coordinator at BCC will work with freshmen advisors at the college for incoming students and with departmental faculty for advanced students to provide proper advisement to ensure appropriate academic progress. The coordinator will also work with academic support offices such as academic counseling and tutoring services to direct students that need these interventions. The coordinator will collect and monitor the following data for A.S. program students:

1) Exit from remediation progress.
2) Semester-to-semester retention rate and GPA attained.
3) Transfer within 3 years.

The City College CCAAP office will be involved in the following assessments:

1) Student transition from BCC to City College. Students who are doing poorly will be referred for tutoring.
2) Student retention.
3) Student graduation within 6 years.
4) Student placement into biotechnology positions.

Some indicators and sources of evidence will be considered as follows:

Objective 1: Continuity

Indicators	**Sources of Evidence**
Curriculum and coursework integration	Faculty analysis and evaluation of alignment of course content and skill requirements across all required courses (transcript analysis and survey/interview review)
Curriculum Progression	Tracking record of student advisement sessions, student registration data, and transcript analysis

Objective 2: Capacity

Indicators	**Sources of Evidence**
Knowledge and skill acquisition (basic and more advanced)	Test results, assignment grades, course pass rates
Overall academic performance	Grade point average, credit accumulation, retention, graduation
Attitudes – knowledge/skill acquisition, academic performance, and impact	Faculty, student, tutor interviews, surveys, focus groups

of/satisfaction with capacity-building efforts	

The AS/BS Joint Degree in Biotechnology will allow BCC students to transition seamlessly to the City College in a manner that maximizes the credits they earned during the AS degree. The benefits of creating such a program to students from BCC are substantial in allowing them access for future graduate training, a strong foundation for a career in biotechnology, the pharmaceutical industry, or academic research, and a mechanism to move under-represented minorities into well paying, highly skilled entry-level jobs.

APPENDIX A

COURSE DESCRIPTIONS

FOR

REQUIRED COURSES

(SED FORM -)

Bronx Community College

Common Core **30 cr**

Required Areas

A. English Composition **6 cr**

ENG 11 **3 rec 1 conf/rec 3cr**
Composition and Rhetoric I
Fundamental principles of organization and rhetoric; practice in expository writing; selected readings, mainly non-fiction; approximately eight papers required, including one research paper with MLA documentation using library resources.
Prerequisite: Passing scores on both the CUNY/ACT Writing Skills Assessment Test and CUNY/ACT Reading Skills Assessment Test.

ENG 12 **3 rec 1 conf/rec 3cr**
Composition and Rhetoric II
Study and application of the principles of organization, rhetoric, and literacy analysis; expository writing and research based on thematically linked readings; development of critical thinking. Research paper with MLA documentation required.
Prerequisite: ENG 10 or ENG 11. It is highly recommended that Liberal Arts students take ENG 12 before any other English elective.

B. Mathematical and Quantitative Reasoning

MTH 31 **6 rec 4 cr**
Analytic Geometry and Calculus I
Limits, rates of change, differentiation and anti-differentiation of algebraic functions, applications, integrals, curve sketching. For Engineering Science students or for Liberal Arts and Sciences students planning to major in mathematics, computer science or physical science.
Prerequisite: MTH 30 or equivalent and ENG 02 and RDL 02 if required.

C. Life and Physical Sciences

BIO 11 **2 lect 4 lab 4cr**
General Biology I
Chemical basis of life; cellular structure, function and reproduction; photosynthesis and cell respiration; human anatomy and physiology; plant structure and function.
Prerequisite: MTH 03 or MTH 05, RDL 02 and ENG 02 if required

Flexible Core

AREAS A-E [courses to be determined, list is currently being developed by college]

E. Scientific World

BIO 12 2 lect 4 lab 4cr
General Biology II
Continuation of BIO 11 with emphasis on plant and animal development; Mendelian and molecular genetics, evolution, animal and plant diversity and ecology.
Prerequisite: BIO 11.

Specialization Requirements

BIO 55 3 lect3cr
Genetics
A survey of the major principles and concepts of the science of heredity. The course reviews classical Mendelian and non-Mendelian genetics. It covers modern genetics including the molecular basis of heredity, gene regulation, developmental genetics, population genetics and biotechnology.
Prerequisite: BIO 12.

BIO XX 2 lect 3 lab 4 cr
Cell & Molecular Biology with an Introduction to Biotechnology
The study of living organisms at the cellular and molecular level concerning the structure and functions of organelles, metabolism, cell signaling, gene structures and function, DNA replication, transcription, translation and control of gene expression. The laboratory portion will focus on basic skills and concepts necessary for the techniques of Biotechnology. These include methods for isolation and characterization of macromolecules (DNA, RNA, Proteins), agarose and polyacrylamide electrophoresis, restriction digests and restriction mapping, PCR, cloning, cell transformations and hybridization reactions.
Prerequisite: BIO 12

CHM 11 1 rec 2 lect 3 lab 4cr
General College Chemistry I
Fundamental principles and theories of chemistry, aspects of atomic structure and bonding, chemical calculations, states of matter, solutions. Laboratory: chemical techniques and principles.
Prerequisites: Placement Exam or CHM 02; and MTH 03 or MTH 05.

CHM 12 1 rec 2 lect 3 lab 4 cr
General College Chemistry II
Solutions, kinetics, equilibria, electrochemistry, properties of non-metallic and metallic elements, nuclear chemistry, organic chemistry. Laboratory: chemical techniques and principles, and qualitative analysis. (Chemistry and other science majors should take CHM 22 in the second semester. Engineering Science majors may choose either CHM 12 or CHM 22 in the second

semester.)
Prerequisite: CHM 11.

CHM 31 **1 rec 3 lect 4 lab 5 cr**
Organic Chemistry I
Structure, nomenclature, properties and reactions of organic compounds including electronic theory and mechanisms. Laboratory: preparation, purification and identification of representative organic compounds.
Prerequisites: CHM 12, 18 or CHM 22.

MTH XX **4 lect 4 cr**
Elements of Calculus and Statistics for Biology Students
Ordinary differential equations and statistics and their applications, such as models of exponential growth and logistical models, steady-state solutions and the stability of solutions of simplest ordinary elementary differential equations and systems of equations, probability rules, data classification, graphical presentation of statistical data, measures of central tendency, regression analysis, examples of discrete (binomial) and continuous (normal) distributions, introduction to construction of confidence intervals and hypothesis testing. More advanced topics such as the Law of Large Numbers and the Central Limit Theorem that require some calculus background.
Prerequisite: MTH 31 or placement for the department

PHY 11 **2 lect 1 rec 2 lab 4cr**
College Physics I
Introduction to principles and methods of physics. Topics include Newton's Laws of Motion, mechanics, heat and sound. (Recommended for Liberal Arts and life science majors, including biology and psychology.)
Prerequisite: Intermediate Algebra or MTH 06.
Corequisite: ENG 02 or RDL 02 if required.

The City College of New York

Biology

48300: Laboratory in Biotechnology
Introduction to DNA isolation, restriction mapping, gene cloning in plasmids and viruses, construction of libraries and other techniques of gene manipulation. Emphasis will be on application of recombinant DNA technology. Prereq.: Bio 22900 and permission of instructor. (W) 2 lect., 6 lab. hr./wk.; 5 cr.

Biomedical Engineering

30000: Impact of Biomedical Technology
This course emphasizes community health care concerns in an urban environment. It has two central themes: (a) Assessment of biomedical technology in the context of urban health needs, and (b) Social and cultural impact of biomedical technology. Prereq.: Soc. 10500 or Anth 10100 or Eco 10000 or Phil 34903 or honors liberal arts course. 3 hr./wk.; 3 cr.

Chemistry

26100: Organic Chemistry I
An introduction to the chemistry of carbon compounds, current interpretation of the reactions and properties of these compounds. Prereq.:Chem 10401. 4 hr./wk.; 3 cr.

26200: Organic Chemistry Laboratory I
(For non-Chemistry majors) Exercises involving the preparation and purification of carbon compounds. Prereq.:Chem 10401 and Chem 26100. Coreq.:Chem 26300. 4 lab. hr./wk.; 2 cr.

26300: Organic Chemistry II
A continuation of Chem 26100. Prereq.:Chem 26100. 4 hr./wk. 3 cr.

45902: Biochemistry I
The course covers the cellular biochemistry of amino acids, proteins, enzymes, carbohydrates, lipids, and nucleic acids. Prereq.:Chem 26300. 3 hr./wk.; 3 cr.

Philosophy

34903: Applied Ethics: Medical Ethics
Critical analysis of moral issues and dilemmas as they arise in various professions and everyday situations. (W) 3 hr./wk.; 3 cr.

Physics

20400: General Physics
For majors in the life sciences (biology, medicine, dentistry, psychology, physical therapy) and for liberal arts students. Fundamental ideas and laws of physics from mechanics to modern

physics. Included are Newton's Laws of motion, electricity and magnetism, heat, optics, relativity, quantum mechanics and nuclear physics. Emphasis is on the basic principles and general laws. Use of mathematics is restricted to elementary algebra and some trigonometry. Physics 20300 is prereq. For Physics 20400 (required for Premed.,Predent., Bio-Med., and all Life Science Students).

2 lect., 1 rec. hr./wk., 3 lab. hr. alt. wks.; 4 cr./sem.

20800: General Physics

Vectors, equilibrium, rectilinear motion. Newton's laws, gravitation, motion in a plane, work and energy, impulse and momentum, rotation and angular momentum, simple harmonic motion, fluids, heat and thermodynamics, waves and acoustics, electrostatics, magnetism and electromagnetism, direct and alternating current, geometrical and physical optics. Pre- or coreq.: Math 20200 for Physics 20700. Physics 20700 is a prereq. for Physics 20800. (Required for all students in the Physical Sciences, Engineering and Computer Science.) 3 lect., 3 rec. hr./wk., 2 lab/wrkshp. Hrs (20700), 2 lab hrs.alt. wks (20800); 4 cr./sem.

APPENDIX B

SYLLABI FOR NEW COURSES

New Course
BIO XX – Cell and Molecular Biology with an Introduction to Biotechnology
2 lecture, 3 lab, 4 credits

Course Description: The study of living organisms at the cellular and molecular level concerning the structure and functions of organelles, metabolism, cell signaling, gene structures and function, DNA replication, transcription, translation and control of gene expression. The laboratory portion will focus on basic skills and concepts necessary for the techniques of Biotechnology. These include methods for isolation and characterization of macromolecules (DNA, RNA, Proteins), agarose and polyacrylamide electrophoresis, restriction digests and restriction mapping, PCR, cloning, cell transformations and hybridization reactions.
Prerequisites: BIO 12

Course Learning Outcomes aligned to BCC GenEd Proficiencies:

- Demonstrate understanding of the molecular aspects of information transfer from DNA to RNA to protein and the principles of gene regulation– **Reasoning & Analysis**
- Demonstrate an understanding of the physical and chemical principles involved in the techniques used to elucidate information transfer and gene function – **Reasoning & Analysis**
- Compare and contrast prokaryotic vs. eukaryotic cells in terms of replication, transcription, translation, gene regulation, and metabolism – **Reasoning & Analysis**
- Demonstrate understanding of cellular respiration and photosynthesis – **Reasoning &Analysis**
- Master basic laboratory skills relevant to biotechnology – **Professional Development**
- Calculate molarities and percentages and correctly formulate solutions – **Mathematical Methods**
- Select and correctly perform the relevant technique suited to the problem at hand – **Professional Development and Reasoning & Analysis**
- Analyze lab results and present them quantitatively – **Reasoning & Analysis and Mathematical Methods**

Lecture Syllabus

Week	Topic
1	Biotechnology Overview of Biotechnology techniques and experimental organisms
2	Techniques for isolation, purification and quantitation of DNA, RNA and proteins Electrophoresis- polyacrylamide and agarose
3	DNA and RNA – Enzymes: their classes and their uses Restriction Digests & Restriction Maps
4	PCR Techniques – amplification of DNA, types of vectors, cloning techniques and library construction
5	Exam I

Week	Topic
	Hybridizations: Southern, Northern & Western
6	Dot blots, nanotechnology and library screening
7	Cell transformations, identifying recombinants Exam II
8	Cell & Molecular Biology Characteristics of Prokaryotic and Eukaryotic Cells Metabolism and Metabolic Pathways
9	Structure and function of organelles
10	Membrane structure and transport
11	Exam III Bioenergetics I Photosynthesis & Cell Respiration
12	Bioenergetics II DNA structure and function DNA replication – correlation with cell cycle and mitosis & meiosis
13	Transcription and Translation Post Transcriptional and Translational processing and modifications
14	Regulation of Gene expression – Transcriptional and Translational

BIO XX – Cell and Molecular Biology with an Introduction to Biotechnology
Lab Syllabus

Week	Topic
1	Lab safety, 31ipetting small volumes Sterile technique – cells and solution making stock solutions
2	Bacterial growth streaking plates and liquid culture techniques
3	Isolation, purification and quantitation of DNA, RNA & Proteins Isolate DNA & plasmids from E. coli preps
4	Bacterial Transformations Agarose gel electrophoresis and sizing DNA
5	Exam I
6	Introduction to restriction digests Electrophoresis of restriction reactions
7	Restriction reactions – single and double digests Electrophoresis of digest products Construction of restriction map
8	PCR (Polymerase Chain Reaction) Isolation of PCR products Probe Design
9	Hybridization – Northern and Southern blots, dot blots
10	Hybridization continued
11	Exam II
12	Cloning DNA ligation, making cells competent
13	Isolating inserts from transformed cells and characterizing them by electrophoresis
14	Exam III

MTH XX—ELEMENTS of CALCULUS and STATISTICS for Biology Students

COURSE OUTLINE

MTH XX **4 lect 4 cr**

Elements of Calculus and Statistics for Biology Students

Ordinary differential equations and statistics and their applications, such as models of exponential growth and logistical models, steady-state solutions and the stability of solutions of simplest ordinary elementary differential equations and systems of equations, probability rules, data classification, graphical presentation of statistical data, measures of central tendency, regression analysis, examples of discrete (binomial) and continuous (normal) distributions, introduction to construction of confidence intervals and hypothesis testing. More advanced topics such as the Law of Large Numbers and the Central Limit Theorem that require some calculus background.

Prerequisite: MTH 31 or placement for the department

Course Learning Outcomes aligned to BCC GenEd Proficiencies:

- Define basic statistical terms and demonstrate an understanding of basic statistical principles and tests to analyze and interpret biological data –**Mathematical Methods**
- Select and apply the relevant statistical principle to analyze biological data – **Mathematical Methods and Reasoning & Analysis**
- Present statistical data using Microsoft Excel – **Mathematical Methods and Professional Development.**
- Solve equations involving exponential and logarithmic functions using both differential and integral calculus. – **Mathematical Methods**
- Apply the relevant tools of calculus to analyze and solve biological problems – **Mathematical Methods and Reasoning & Analysis**
- Demonstrate an understanding of modeling using ordinary differential equations – **Mathematical Methods**

Section	**Topic**		**Time** (in hours)
	Derivatives and antiderivatives of exponential and logarithmic functions		4
1.1-1.2	Review of Calculus		2
Appendix A	Intro. To Excel		1
2.1-2.2	Intro. To ODEs, separable ODEs		3
2.3	Exponential growth		1
3.1-3.2	Euler's method		2
4.2	Steady state solutions		1
4.3	Geometric analysis		2
4.4	Stability		1

5.1-5.2	Malthus model, harvesting		2
5.3	Logistic model		1
6.1-6.2	Systems of ODEs		2
6.3	Steady states, Phase plots		1
6.4-6.5	Stability; application to epidemics		Time permitting
7.1-7.2	Histograms		1
7.3-7.4	Measures of central symmetry and spread		2
7.5-7.6	Box plots, five-point summery, estimation		1
8.1-8.3	Correlation coefficient		2
9.1-9.3	Method of least squares; prediction		2
9.4-9.5	More on regression		Time permitting
10.1-10.2	Intro. To probability		1
10.3-10.4	Counting		2
10.5	Probability rules		2
11.1-11.3	Mutually disjoint and independent events. Conditional probability and Bayes' theorem		Time permitting
12.1-12.4	Genetics; Hardy-Weinberg theorem		Time permitting
13.1-13.2	Discrete random variables		2
13.3	Binomial distribution		2
13.4	Poisson distribution		1
14.1-14.2	Continuous random variables; uniform distribution		1
14.3-14.4	Normal distribution		3
14.5	Normal approximation to binomial distribution		2
15.1-15.3	Inferential statistics; confidence intervals (large samples)		3
15.4	Small samples (t distribution)		1
			Total: 51

5 hours left for reviews, tests, etc.

APPENDIX C

SAMPLE PROGRAM SCHEDULING
(SED FORM)

Undergraduate Program Schedule

- Indicate **academic calendar** type: _X_Semester __Quarter __Trimester __Other (describe)
- Label each term in sequence, consistent with the institution's academic calendar (e.g., Fall 1, Spring 1, Fall 2)
- Use the table to show **how a typical student may progress through the program**; copy/expand the table as needed.

Term: Fall 1		Check course classification(s)			
Course Number & Title	Cr	LAS	Maj	New	Prerequisite(s)
Req. Core C: BIO 11 General Biology I [δ]	4	X			
Req. Core B: MTH 31 Geometry and Analytical Calculus I	4	X			
Required Core A	3	X			
Flexible Core A-E	3	X			
Term credit total:	14				

Term: Spring 1		Check course classification(s)			
Course Number & Title	Cr	LAS	Maj	New	Prerequisite(s)
Flex. Core E: BIO 12 General Biology II	4	X			BIO 11
MTH XX Elements of Calculus and Statistics	4		X	X	MTH 31
Required Core A	3	X			
Flexible Core A-E	3	X			
Term credit total:	14				

Term: Fall 2		Check course classification(s)			
Course Number & Title	Cr	LAS	Maj	New	Prerequisite(s)
BIO 55 Genetics	3		X		BIO 12
CHM 11 General College Chemistry I	4		X		
Flexible Core A-E	6	X			
MTH 30 or Free elective	3-4	X			
Term credit total:	16-17				

Term: Spring 2		Check course classification(s)			
Course Number & Title	Cr	LAS	Maj	New	Prerequisite(s)
BIO XX Cell and Molecular Biology	4		X	X	BIO 12 & BIO 55
CHM 12 General Chemistry II	4		X		CHM 11
PHY 11 College Physics I or CHM 31	4-5	X			CHM 12 for CHM 31
Flexible Core A-E	3	X			
Term credit total:	15-16				

Term: Fall 3		Check course classification(s)			
Course Number & Title	Cr	LAS	Maj	New	Prerequisite(s)
BIO 35500 Introduction to Scientific Literature using CREATE	4		X		BIO 20600 or BIO 22900 or BIO XX
CHEM 26100 Organic Chemistry I	3		X		CHM 12
SCI 28000 Bioinformatics & Biomolecular Systems	4		X		BIO 11-12 OR CHM 11-12; coreq: BIO 55
College Option	3	X			
Term credit total:	14				

Term: Spring 3		Check course classification(s)			
Course Number & Title	Cr	LAS	Maj	New	Prerequisite(s)
BIO 48300 Laboratory in Biotechnology	5		X		BIO XX (BIO 22900 equivalent)
CHEM 26300 Organic Chemistry II	3		X		CHEM 26100
CHEM 26200 Organic Chemistry Laboratory I	2		X		CHM 12 & CHEM 26100; coreq. CHEM 26300
BIO 31000 Independent Study	3		X		Department approval
College Option	3	X			
Term credit total:	16				

Term: Fall 4		Check course classification(s)			
Course Number & Title	Cr	LAS	Maj	New	Prerequisite(s)
CHEM 45902 Biochemistry I	3		X		CHEM 26300
BIO 31000 Independent Study	3		X		Department approval
PHYS 20400 General Physics II	4	X			
General Electives	6	X			
Term credit total:	16				

Term: Spring 4		Check course classification(s)			
Course Number & Title	Cr	LAS	Maj	New	Prerequisite(s)
PHIL 34903 Applied Ethics: Medical Ethics	3		X		
BIO 35000 Advanced Microbiology	4		X		BIO XX or 22900
General Electives	7	X			
Term credit total:	14				

Program Totals:	**Credits: 120**	**Liberal Arts & Sciences: 63**	**Major: 57**	**Elective & Other: 22**

Cr: credits **LAS**: liberal arts & sciences **Maj**: major requirement **New**: new course **Prerequisite(s)**: list prerequisite(s) for the noted courses

[δ]Courses in ***italics*** are taken at Bronx Community College, all other courses are taken the City College.

APPENDIX E

FACULTY TEACHING ASSIGNMENTS (SED FORM)

Full-Time Faculty*

Faculty teaching at the graduate level must have an earned doctorate/terminal degree or demonstrate special competence in the field. Provide information on faculty members who are **full-time at the institution** and who will be teaching each course in the major field or graduate program. The application addendum for professional licensure, teacher certification, or educational leadership certification programs may provide additional directions for those types of proposals.

Faculty Member Name and Title (include and identify Program Director)	**Program Courses to be Taught**	**Percent Time to Program**	**Highest and Other Applicable Earned Degrees & Disciplines** (include College/University)	**Additional Qualifications:** list related certifications/ licenses; occupational experience; scholarly contributions, etc.
Faculty at Bronx Community College				
Abdullahai, Abass (BCC)	BIO 11 General Biology I BIO 12 General Biology II BIO 55 Genetics BIO XX Cell and Molecular Biology with Introduction to Biotechnology		Ph.D. , Michigan Tech University, Biological Science	
Akkaraju, Shylaja(BCC)	BIO 11 General Biology I BIO 12 General Biology II BIO 55 Genetics BIO XX Cell and Molecular Biology with Introduction to Biotechnology		Ph.D., University of Louisville, Genetics	
Fein, Martin(BCC)	BIO 11 General Biology I BIO 12 General Biology II BIO 55 Genetics BIO XX Cell and Molecular Biology with Introduction to Biotechnology		Ph.D., CUNY, Biophysics	
Tian, Rujin (BCC)	BIO 11 General Biology I BIO 12 General Biology II BIO 55 Genetics BIO XX Cell and Molecular Biology with Introduction to Biotechnology		Ph.D., Columbia Univ., Neuroscience	
Wolf, Alexander(BCC)	BIO 11 General Biology I BIO 12 General Biology II BIO 55 Genetics BIO XX Cell and Molecular Biology with Introduction to Biotechnology		Ph.D., Univ. of Chicago, Developmental Biology	

Faculty teaching at the graduate level must have an earned doctorate/terminal degree or demonstrate special competence in the field. Provide information on faculty members who are **full-time at the institution** and who will be teaching each course in the major field or graduate program. The application addendum for professional licensure, teacher certification, or educational leadership certification programs may provide additional directions for those types of proposals.

Faculty Member Name and Title (include and identify Program Director)	**Program Courses to be Taught**	**Percent Time to Program**	**Highest and Other Applicable Earned Degrees & Disciplines** (include College/University)	**Additional Qualifications:** list related certifications/ licenses; occupational experience; scholarly contributions, etc.
Faculty at City College of New York				
Janakiraman, Anuradha	Bio 35000 Advanced Microbiology^		Ph.D., Univ. of Illinois, Microbiology	
Lee, John	Bio 35000 Advanced Microbiology^		Ph.D., New York Univ., Biology	
Hoshins, Sally	Bio 35500 C.R.E.A.T.E. Bio 37500 Developmental Biology		Ph.D., Univ. of Chicago, Biology	
Govind, Shubha	Bio 37500 Developmental Biology Bio 38000 Eukaryotic Genetics Sci 28000 Bioinformatics &Biomolecular Systems		Ph.D., Univ. of Illinois, Cell Biology	
Li, Christine	Bio 37500 Developmental Biology Bio 38000 Eukaryotic Genetics Bio 48300 Laboratory in Biotechnology		Ph.D., Harvard University, Neurobiology	
Venkatesh, Tadmiri	Bio 38000 Eukaryotic Genetics		Ph.D., Birla Inst. Of Tech. & Science (India), Zoology	
Hubbard, Karen	Bio 41000 Development & Cellular Senescence		Ph.D., Illinois Inst. Of Technology, Biology	
Anderson, Robert	Bio 30100-30300 Honors I-III Bio 31000 Independent Study		Ph.D., Univ. of Kansas, Biology	
Pezzano, Mark	Bio 42000 Virology		Ph.D., CUNY, Cell & Molecular Biology	
Saleque, Shireen	Bio 42500 Cancer Biology		Ph.D., Albert Einstein School of Medicine, Immunology	
Carnaval, Ana	Bio 48300 Laboratory in Biotechnology		Ph.D., Univ. of Chicago, Biology	
Balogh-Nair, Valeria	Chem 26100 Organic Chemistry I		Ph.D., Univ. of Louvain	

Faculty teaching at the graduate level must have an earned doctorate/terminal degree or demonstrate special competence in the field. Provide information on faculty members who are **full-time at the institution** and who will be teaching each course in the major field or graduate program. The application addendum for professional licensure, teacher certification, or educational leadership certification programs may provide additional directions for those types of proposals.

Faculty Member Name and Title (include and identify Program Director)	**Program Courses to be Taught**	**Percent Time to Program**	**Highest and Other Applicable Earned Degrees & Disciplines** (include College/University)	**Additional Qualifications:** list related certifications/ licenses; occupational experience; scholarly contributions, etc.
	Chem 26200 Organic Chemistry Laboratory		(Belgium)	
Salame, Isse	Chem 26100 Organic Chemistry I		Ph.D., CUNY, Chemistry	
Bu, Zimei	Chem 26200 Organic Chemistry Laboratory		Ph.D., Louisiana State Univ., Chemistry	
Boson, Sean	Chem 26300 Organic Chemistry II		Ph.D., University of Cambridge (UK), Chemistry	
Ghose, Ranajeet	Chem 33500 Physical Biochemistry		Ph.D., Yale University, Chemical Physics	
	Chem 45902 Biochemistry I			
	Chem 48005 Biochemistry II			
Bandosz, Teresa	Chem 40600 Environmental Chemistry		Ph.D., Technical Univ. of Cracow, Chemistry	
Jans, Urs	Chem 40600 Environmental Chemistry		Ph.D., Swiss Federal Inst. Of Technology, Chemistry	
Calhoun, David	Chem 45902 Biochemistry I		Ph.D., Univ. of Alabama, Chemistry	
	Chem 48005 Biochemistry II			
Ryan, Kevin	Chem 45902 Biochemistry I		Ph.D., Univ. of Rochester, Biochemistry	
	Chem 48005 Biochemistry II			
Schaffler, Mitchell	Engr 30000 Impact of Biomedical Technology		Ph.D., West Virginia Univ., Anatomy/Orthopaedics	
Blustein, Jeffrey	Phil 34900 Applied Ethics		Ph.D., Harvard University, Philosophy	
Chang, Ngee-Pong	Phys 20300 General Physics I		Ph.D., Columbia University, Physics	
Gayen, Taposh	Phys 20300 General Physics I		Ph.D., Univ. of Connecticut, Physics	
	Phys 20800 General Physics II			
Gersten, Joel	Phys 20400 General Physics II		Ph.D., Columbia University,	

Faculty teaching at the graduate level must have an earned doctorate/terminal degree or demonstrate special competence in the field. Provide information on faculty members who are **full-time at the institution** and who will be teaching each course in the major field or graduate program. The application addendum for professional licensure, teacher certification, or educational leadership certification programs may provide additional directions for those types of proposals.

Faculty Member Name and Title (include and identify Program Director)	**Program Courses to be Taught**	**Percent Time to Program**	**Highest and Other Applicable Earned Degrees & Disciplines** (include College/University)	**Additional Qualifications:** list related certifications/ licenses; occupational experience; scholarly contributions, etc.
			Physics	
Makse, Hernan	Phys 20400 General Physics II		Ph.D., Boston University, Physics	
Smith, Frederick	Phys 20700 General Physics I		Ph.D., Brown University, Physics	
Tu, Jiufeng	Phys 20700 General Physics I		Ph.D., Cornell University, Physics	
Petricevic, Vladimir	Phys 20800 General Physics II		Ph.D., CUNY, Physics	
Schmeltzer, David	Phys 20800 General Physics II		D.Sc., Technion Univ., Physics	
Koder, Ronald	Phys 31500 Medical Physics		Ph.D., Johns Hopkins University, Biophysics	
	Phys 42200 Biophysics			
	Phys 52200 Biomedical Physics			
Gunner, Marilyn	Phys 42200 Biophysics		Ph.D., Univ. of Pennsylvania, Biophysics	
*All listed faculty members are full-time faculty members; no teaching adjuncts are listed. ^The name of Bio 35000 is being changed from Microbiology to Advanced Microbiology (please see April 2011 Chancellor's Report).				

Additional faculty at City College not teaching courses in the program who are conducting biotechnology research at CCNY

Ali, Kamilah	Guyden, Jerry	Rodriguez-Contreras, Adrian
Bu, Zimei	John, George	Stark, Ruth
Caplan, Avrom	Koder, Ronald	
Emerson, Mark	Lazaridis, Themis	

APPENDIX E

NEW RESOURCES TABLE (CUNY)

(SED FORM)

New Resources Table

Expenditures	Year 1 2013-2014	Year 2 2014-2015	Year 3 2015-2016	Year 4 2016-2017	Year 5 2017-2018
Full Time Faculty	$0	$0	$0	$0	$88,445
Part Time Faculty	$8,778	$19,019	$23,408	$29,260	$0
Full Time Staff	$0	$0	$0	$0	$0
Part Time Staff (College Lab Techs)	$0	$0	$1,423	$1,423	$2,847
Library (Includes Staffing)	$0	$0	$0	$0	$0
Equipment	$0	$0	$0	$0	$0
Laboratories	$0	$0	$5,000	$5,000	$5,000
Supplies & Expenses (Other than Personal Services)	$4,000	$ 8,200	$ 10,000	$ 12,100	$ 14,000
Capital Expenditures	$0	$0	$0	$0	$0
Other	$0	$0	$0	$0	$0
Total all	$12,778	$27,219	$34,831	$42,783	$105,292

APPENDIX F

PROJECTED REVENUES TABLE

(SED FORM)

Projected Revenue Related to the Proposed Program					
Revenues[7]	1st Year 2013-2014	2nd Year 2014-2015	3rd Year 2015-2016	4th Year 2016-2017	5th Year 2017-2018
Tuition Revenue[8]					
01. From Existing Sources[9]	$0	$72,981	$130,076	$162,365	$177,871
02. From New Sources[10]	$107,325	$109,472	$111,661	$113,894	$116,172
03. Total	$107,325	$182,453	$241,737	$276,259	$294,043
State Revenue[11]					
04. From Existing Sources	$0	$37,488	$63,616	$77,248	$82,928
05. From New Sources	$54,528	$54,528	$54,528	$54,528	$54,528
06. Total	$54,528	$92,016	$118,144	$131,776	$137,456
Other Revenue[12]					
07. From Existing Sources	$0	$0	$0	$0	$0
08. From New Sources	$0	$0	$0	$0	$0
09. Total	$0	$0	$0	$0	$0
Grand Total[13]					
10. From Existing Sources	$0	$110,469	$193,692	$239,613	$260,799
11. From New Sources	$161,853	$164,000	$166,189	$168,422	$170,700
TOTAL	$161,853	$274,469	$359,881	$408,035	$431,499

[7] An inflation rate of 2% has been used for projections.
[8] Tuition was calculated at the rate of $1,400 per full time equivalent (FTE)
[9] There are 854 FTE students enrolled in existing courses in the department per year calculated from the following formula: FTE = # students/section x # sections X credits /section/(FTE credits/FTE)
[10] New source tuition is calculated from the FTE estimated from projected enrollment in new program. See table on p.5
[11] State aid is calculated at a rate of $2,675 per FTE.
[12] Funding for equipment for a biotechnology laboratory will be used from a Department of Education grant.
[13] Enter total of Tuition, State and Other Revenue, from Existing or New Sources.

APPENDIX G

SUPPORTING MATERIALS FOR PROJECTED REVENUES TABLE

Supporting Material for Projected Revenue

The Five-Year Revenue Projections for Program

COMMUNITY COLLEGE WORKSHEET

	Year One	Year Two	Year Three	Year Four	Year Five
Tuition & Fees:					
Existing Students are students currently enrolled in another program at your college, or students who would have enrolled in another program at your college, had the new program not been established.					
Number of Majors (Enter # of EXISTING FULL TIME In State Students)	0	11	17	20	21
Tuition Income calculates 2% increase per year	$3,900	$3,978	$4,058	$4,139	$4,221
Total Tuition	$0	$43,758	$68,979	$82,774	$88,651
Student Fees (enter ANNUAL program fees other than standard CUNY fees)					
Total Fees	0	0	0	0	0
Total Instate Tuition & Fees	$0	$43,758	$68,979	$82,774	$88,651
Tuition & Fees:					
Number of Majors (Enter # of EXISTING FULL TIME Out of State Students)	0	0	1	1	1
Tuition Income calculates 2% increase per year	$7,800	$7,956	$8,115	$8,277	$8,443
Total Tuition	$0	$0	$8,115	$8,277	$8,443
Student Fees (enter ANNUAL program fees other than standard CUNY fees)					
Total Fees	0	0	0	0	0
Total Out of State Tuition & Fees	$0	$0	$8,115	$8,277	$8,443
TOTAL EXISTING FULL TIME TUITION REVENUE	$0	$43,758	$77,094	$91,052	$97,094

	Year One	Year Two	Year Three	Year Four	Year Five
Tuition & Fees:					
Number of Majors (Enter # of EXISTING PART-TIME In State Students)	0	10	19	24	27
Total Enrolled Credits (Enter Avg # credits per student per year-Fall+ Spring+Summer) i.e. 6 Fall, 6 Spring, 3 Summer=15	15	15	15	15	15
Tuition Income (Specify Rate per credit) calculates 2% increase per year	$165	$168	$172	$175	$179
Total Tuition	$0	$25,245	$48,925	$63,036	$72,334
Student Fees (enter ANNUAL program fees other than standard CUNY fees)					
Total Fees	0				
Total Instate Tuition & Fees	$0	$25,245	$48,925	$63,036	$72,334
Tuition & Fees:					
Number of Majors (Enter # of EXISTING PART-TIME Out of State Students)	0	1	1	2	2
Total Enrolled Credits (Enter Avg # credits per student per year-Fall+ Spring+Summer) i.e. 6 Fall, 6 Spring, 3 Summer=15	0	15	15	15	15
Tuition Income calculates 2% increase per year	$260	$265	$271	$276	$281
Total Tuition	$0	$3,978	$4,058	$8,277	$8,443
Student Fees (enter ANNUAL program fees other than standard CUNY fees)					
Total Fees	0				
Total Out of State Tuition & Fees	$0	$3,978	$4,058	$8,277	$8,443
TOTAL EXISTING PART TIME REVENUE	$0	$29,223	$52,982	$71,313	$80,776
TOTAL EXISTING REVENUE	$0	$72,981	$130,076	$162,365	$177,871

	Year One	Year Two	Year Three	Year Four	Year Five
Tuition & Fees:					
New Students are students who would NOT have enrolled in another program at your college, had the new program not been established.					
Number of Majors (Enter # of NEW FULL TIME In State Students)	15	15	15	15	15
Tuition Income (Specify Rate per credit) calculates 2% increase per year	$3,900	$3,978	$4,058	$4,139	$4,221
Total Tuition	$58,500	$59,670	$60,863	$62,081	$63,322
Student Fees (enter ANNUAL program fees other than standard CUNY fees)					
Total Fees	0	0	0	0	0
Total Instate Tuition & Fees	$58,500	$59,670	$60,863	$62,081	$63,322
Tuition & Fees:					
Number of Majors (Enter # of NEW FULL TIME Out of State Students)	1	1	1	1	1
Tuition Income (Specify Rate per credit) calculates 2% increase per year	$7,800	$7,956	$8,115	$8,277	$8,443
Total Tuition	$7,800	$7,956	$8,115	$8,277	$8,443
Student Fees (enter ANNUAL program fees other than standard CUNY fees)					
Total Fees	0	0	0	0	0
Total Out of State Tuition & Fees	$7,800	$7,956	$8,115	$8,277	$8,443
TOTAL NEW FULL TIME TUITION REVENUE	$66,300	$67,626	$68,979	$70,358	$71,765

	Year One	Year Two	Year Three	Year Four	Year Five
Tuition & Fees:					
Number of Majors (Enter # of NEW PART-TIME In State Students)	15	15	15	15	15
Total Enrolled Credits (Enter Avg # credits per student per year-Fall+ Spring+Summer) i.e. 6 Fall, 6 Spring, 3 Summer=15	15	15	15	15	15
Tuition Income calculates 2% increase per year	$165	$168	$172	$175	$179
Total Tuition	$37,125	$37,868	$38,625	$39,397	$40,185
Student Fees (enter ANNUAL program fees other than standard CUNY fees)					
Total Fees	0				
Total Instate Tuition & Fees	$37,125	$37,868	$38,625	$39,397	$40,185
Tuition & Fees:					
Number of Majors (Enter # of NEW PART-TIME Out of State Students)	1	1	1	1	1
Total Enrolled Credits (Enter Avg # credits per student per year-Fall+ Spring+Summer) i.e. 6 Fall, 6 Spring, 3 Summer=15	15	15	15	15	15
Tuition Income (Specify Rate per credit) calculates 2% increase per year	$260	$265	$271	$276	$281
Total Tuition	$3,900	$3,978	$4,058	$4,139	$4,221
Student Fees (enter ANNUAL program fees other than standard CUNY fees)					
Total Fees	0	0	0	0	0
Total Out of State Tuition & Fees	$3,900	$3,978	$4,058	$4,139	$4,221
TOTAL NEW PART TIME REVENUE	$41,025	$41,846	$42,682	$43,536	$44,407
TOTAL NEW REVENUE	$107,325	$109,472	$111,661	$113,894	$116,172

	Year One	Year Two	Year Three	Year Four	Year Five
# CURRENT FTEs (use prorated FTEs for PT Students)	0	16.5	28	34	36.5
Appropriation per FTE (FY13)	$2,272	$2,272	$2,272	$2,272	$2,272
STATE REVENUE FROM EXISTING SOURCES -LINKS TO REVENUE SPREADSHEET ROW 9	$0	$37,488	$63,616	$77,248	$82,928
# NEW FTEs (use prorated FTE for PT Students)	24	24	24	24	24
Appropriation per FTE (FY10)	$2,272	$2,272	$2,272	$2,272	$2,272
STATE REVENUE FROM NEW SOURCES -LINKS TO REVENUE SPREADSHEET ROW 11	$54,528	$54,528	$54,528	$54,528	$54,528
FOR YEARS 2-5 INCLUDE CONTINUING FTE FROM PREVIOUS YEARS					
	Year One	**Year Two**	**Year Three**	**Year Four**	**Year Five**
Other Revenue From Existing Sources (specify and explain)-LINKS TO REVENUE SPREADSHEET ROW 13)					
Other Revenue New (specify and explain) (LINKS TO REVENUE SPREADSHEET ROW 15)					

APPENDIX H

FIVE YEAR FINANCIAL PROJECTION

The Five-Year Financial Projections for Program

	Year 1	Year 2	Year 3	Year 4	Year 5
Direct Operating Expenses (Include additional expenses incurred by other programs when satisfying needs of new program):					
Current Full Time Faculty Replacement Costs (list separately)					
Current Full Time Faculty Overload (include Summer)					
New Full Time Faculty Base Salary (list separetely)					$66,500
New Full Time Faculty Overload (include Summer)					
New Faculty Re-assigned Time (list separately)					
Full Time Employee Fringe Benefits (33.0%)	$0	$0	$0	$0	$21,945
Total (Links to Full-Time Faculty on Program Exp Worksheet)	**$0**	**$0**	**$0**	**$0**	**$88,445**
Part Time Faculty Actual Salaries	$7,980	$17,290	$21,280	$26,600	
Part Time Faculty Actual Fringe Benefits (10%)	$798	$1,729	$2,128	$2,660	$0
Total (Links to Part-Time Faculty Program Exp Worksheet)	**$8,778**	**$19,019**	**$23,408**	**$29,260**	**$0**
Full Time Staff Base Salary (list separately)					
Full Time Staff Fringe Benefits (33%)	$0	$0	$0	$0	$0
Total (Links to Full-Time Staff on Program Exp Worksheet)	**$0**	**$0**	**$0**	**$0**	**$0**

(DO NOT INCLUDE NEW LIBRARY STAFF IN THIS SECTION)	Year 1	Year 2	Year 3	Year 4	Year 5
Part Time Staff Base Salary (list separately)	$0	$0	1294	1294	2588
Graduate Assistants					
Student Hourly					
Part Time Employee Fringe Benefits (10.0%)	$0	$0	$129.4	$129.4	$258.8
Total (Links to Part-Time Staff on Program Exp Worksheet)	**$0**	**$0**	**$1423.4**	**$1,423.4**	**$2,846.8**
LIBRARY					
Library Resources					
Library Staff Full Time (List Separately)					
Full Time Staff Fringe Benefits (33%)	**$0**	**$0**	**$0**	**$0**	**$0**
Library Staff Part Time (List Separately)					
Part Time Employee Fringe Benefits (10.0%)	**$0**	**$0**	**$0**	**$0**	**$0**
TOTAL (Links to Library on Program Exp Worksheet)	**$0**	**$0**	**$0**	**$0**	**$0**
EQUIPMENT					
Computer Hardware					
Office Furniture					
Other (Specify)					
Total (Links to Equipment on Program Exp Worksheet)	**$0**	**$0**	**$0**	**$0**	**$0**
LABORATORIES					
Laboratory Equipment					
Other (list separately)					
TOTAL (Links to Laboratories on Program Exp Worksheet)	**$0**	**$0**	**$0**	**$0**	**$0**

	Year 1	Year 2	Year 3	Year 4	Year 5
SUPPLIES AND EXPENSES (OTPS)					
Consultants and Honoraria					
Office Supplies					
Instructional Supplies	$4,000	$8,200	$10,000	$12,100	$14,000
Faculty Development					
Travel and Conferences					
Membership Fees					
Advertising and Promotion					
Accreditation					
Computer Software					
Computer License Fees					
Computer Repair and Maintenance					
Equipment Repair and Maintenance					
New Total Supplies and OTPS Expenses (Links to Supplies on Program Exp Worksheet	**$4,000**	**$8,200**	**$10,000**	**$12,100**	**$14,000**
CAPITAL EXPENDITURES					
Facility Renovations					
Classroom Equipment					
Other (list separately)					
TOTAL (Links to Capital Expenditures on Program Exp Worksheet)	$0	$0	$0	$0	$0
Other (list separately)					
TOTAL (Links to Other on Program Exp Worksheet)	$0	$0	$0	$0	$0

APPENDIX I

LETTER OF SUPPORT

COLUMBIA UNIVERSITY
in the City of New York
Department of Biological Sciences
M. A. Program in Biotechnology

October 25, 2012

Professor Martin Fein
Department of Biology
& Medical Laboratory Technology
2155 University Avenue
Bronx, New York 10453

Dear Professor Fein,

I enthusiastically support your effort in establishing an A.S. Program in Biotechnology at Bronx Community College.

As a director of a graduate program in biotechnology, I am keenly aware of the importance of solid academic foundation as well as practical skills in students' academic and career developments. Your A.S. Program in Biotechnology will provide crucial preparations for them to enter the biotechnology field as it aligns extremely well with anticipated industry workforce needs and continuing academic progressions.

Columbia University's MA Biotechnology Program benefits tremendously from well-prepared students, many of whom started their higher education tenures in community college programs such as the AS Program you are creating. Should any of your students have questions regarding our program, or wish to discuss graduate degrees in biotechnology in general, please encourage them to contact me.

I look forward to seeing your endeavour come to fruition and welcome any possibility that I may be of assistance in the process.

Sincerely,

Carol S. Lin, PhD, MAE
Director
e-mail CSL27@columbia.edu

Sherman Fairchild Center for Life Sciences 1212 Amsterdam Avenue, MC 2407 New York, NY 10027
http://www.columbia.edu/cu/biology/grad/biotech
Tel (212) 854-4042 Fax (212) 865-8246 biotech@biology.columbia.edu

APPENDIX I

REPRESENTATIVE JOB POSTINGS IN BIOTECHNOLOGY

Howard Hughes Medical Institute

JOB ANNOUNCEMENT

Title: Research Tehnician

Job Number: 057103-006

Job Type: Laboratory/Research

Posted on: 09/06/2012

Employment Category: Full Time (40 hours/week)

Location:
New York University
New York, New York

Reports to:
Dan Littman, MD PhD
Investigator
Research Abstract

Job Summary:

At the Howard Hughes Medical Institute (HHMI), creativity and excellence are fundamental to our success. As one of the world's largest philanthropies, HHMI is a major force in advancing biomedical research and science education in the U.S. and beyond. We have an opportunity for a Research Technician to join one of our laboratories at New York University in New York, NY.

Our laboratory is seeking an energetic and highly motivated Research Technician to work in the area of immunology, transcriptional regulation, and mouse genetics. We have a dynamic and diverse group of scientists. Most technicians leave the lab after 2-3 years well positioned for graduate or medical school. We're located at NYU medical center, in Manhattan at 1st Ave. and 30th St.

Principal Responsibilities:

- Assist postdoctoral fellows with experiments in molecular biology, and immunology
- Perform independent research project when sufficient skills are acquired
- Participate in laboratory meetings and read literature applicable to the research area
- Help with maintenance and organization of lab mouse strains, including genotyping
- Help with lab organization and unpacking of delivered equipment and supplies
- Perform the duties of a Laboratory Assistant as required, including recombinant DNA methods, cell culture, and flow cytometry

Preferred Qualifications:

- Bachelor's degree in life science, with courses in molecular biology
- Minimum 2 years experience in a life sciences laboratory
- Generally experienced in molecular biology (PCR, DNA and RNA isolation, cloning), mammalian cell culture, and handling mice (breeding, weaning and maintaining lines, tail DNA prep)
- Excellent analytical, organizational, communication, and computer skills
- Able to work independently and as a team member
- Able to use experience to perform a variety of new techniques
- Able to learn complex tasks with general instruction
- Actively seeks opportunities to increase skills and expertise

Additional Information:

Please forward your CV, cover letter and contact information for three professional references via e-mail or mail to the address listed above.

To Apply

To apply for this position, please email your resume to:

Jeff Blenker
Laboratory Manager I
Skirball Institute/HHMI
540 First Avenue SKI 2-17
New York, New York 10016
Fax: 212-263-1498
E-mail: jeff.blenker@med.nyu.edu

Application Deadline:

Open Until Filled

HHMI is an Equal Opportunity Employer

Rockefeller University

Job: IRC12540

A. Description

Job Title	**Research Assistant**
Employment Status	**Full Time**
Laboratory / Department	**Lymphocyte Biology**
Department Description	

One of the unique features of the immune system is that it has evolved to raise antibodies against an unlimited number of antigens. The number of different antibodies raised in the lifetime of an organism is too large to be encoded in the genome. Instead, the immune system has evolved specific mechanisms that create a large number of diverse antibody specificities starting from a limited amount of genetic material. Our laboratory studies the different processes which are employed by B lymphocytes to generate this diversity.

Detailed Description

Will be responsible for generating plasmid constructs for mammalian cell line creation as well as for trypanosome cell line creation, assaying mutants of a particular set of genes in a mammalian cell line system using FACS analysis, and purifying protein complexes and identifying proteins that co-purify with the gene of interest.

Job Requirements

Bachelor's degree in science required; educational emphasis in immunology preferred. Must have experience with general molecular biology techniques including DNA/RNA isolation, PCR, RT-PCR, cloning, protein purification, ELISA, and FACS analysis. Must be knowledgeable of tissue culture (aseptic) techniques, mammalian cell culture transfection and clone isolation, trypanosome cell culture transfection and clone isolation, virus production, and mammalian cell infection.

Additional Details

The Rockefeller University is an Equal Opportunity Employer with a policy that forbids discrimination in employment (which includes hiring, terms and conditions, promotion, and termination) on the basis of race, color, religion, sex, age, national origin, citizenship status, marital status, sexual orientation, military status, veteran status, or disability. The Administration has an Affirmative Action Program to increase the employment of women and members of protected classes in all areas of the University's activities.

COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK

Human Resources
Employment Opportunities

Position Information

Job Title	Senior Technician
Job Code Title	510214
Job Requisition Number	065711
Department	8201- MDM MSPH Admin
Location	Medical Center
Job Type	Support Staff Full-Time Regular
Bargaining Unit	1199 / SSA Area
If temporary, indicate duration	
Job Family	Research Support (Laboratory and Non-Laboratory)
Salary Grade	Technical 5-075
Salary Range	$826.44/week
Advertised Summary Job Description	Grant Funded: The candidate will work with a team of researchers in Center for Immunity and Infection, Mailman School of Public Health. Incumbent will report to the Principal Investigator and apply experience and expertise in the application of molecular biological diagnostic techniques in projects focused on microbial surveillance and discovery. The candidate will set up and carry out experiments involving PCR, cDNA cloning, labeling DNA, microarray hybridizations, RNA extraction from tissue cultures, and preparation of templates for DNA sequencing. Candidate is expected to analyze results of microarray hybridizations, design experiments independently, and report findings to the principal investigator. S/he will assist in leading and training of other technicians and perform other related duties as assigned.
Minimum Qualifications for Grade Applicant **MUST** meet these minimum qualifications to be considered an applicant	Requires a bachelor's degree and at least 1.5 years of related experience or equivalent in education, training and experience. The candidate selected for this position is required to undergo a full

	background check and drug screening test prior to a final offer of employment being made.
Additional Position-Specific Minimum Qualifications Applicant **MUST** meet these minimum qualifications to be considered an applicant	Training or experience in a laboratory environment and knowledge of lab safety. Proficiency in Molecular Biology and the application of molecular biological diagnostic techniques.
Preferred Qualifications	
Special Instructions	
Special Indications This position works with:	Bloodborne pathogens Infectious agents/lasers
HIPAA Compliance training required	Yes
Participation in Medical Surveillance required	Yes
What type of posting? Is this a waiver request?	Standard Posting
Requisition Open Date	05-03-2012
Requisition Close Date	Open Until Filled
Quick Link	jobs.columbia.edu/applicants/Central?quickFind=129938
EEO Statement	Columbia University is an Equal Opportunity/Affirmative Action employer.
Local Hiring	Columbia University is committed to the hiring of qualified local residents.

Memorial Sloan-Kettering Cancer Center

Research Technician, Soft Tissue Sarcoma

Added 12/17/2012

New York, NY

Research Support

Job ID: 2694

APPLY NOW

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Memorial Sloan-Kettering Cancer Center is a world renowned organization dedicated to the progressive control and cure of cancer through programs of patient care, research, and education.

We are looking for an experienced research technician to join an NIH funded laboratory dedicated to gene target identification and drug discovery in soft tissue sarcoma through a genome-wide genetic and functional analysis. The overall goal of the lab is to perform a comprehensive molecular genetic and functional analysis of soft tissue sarcoma, so as to elucidate the mutational programs and pathways involved in sarcomagenesis and to identify novel therapeutic targets. Our lab screens the genes and microRNAs that are involved in proliferation, differentiation, and survival of sarcoma cell lines. Potential targets are validated by functional assays in additional cell lines and in xenograft models. Results will be translated into new therapeutics for soft tissue sarcoma.

You will work on various projects involving the following techniques: isolation of mRNA and DNA, qRT-PCR, PCR, DNA cloning, plasmid /miRNA/siRNA transfection, viral infection, Northern and Western blotting, fluorescence in situ

hybridization, gel electrophoresis, cell culture (primary cell culture is a plus), cell proliferation and apoptosis assays.

Qualifications:

- BA/BS in bioscience or related field
- Experience in cell biology and molecular biology is required
- Prior experience with cancer research and miRNA regulation is strongly preferred
- Excellent organizational skills and attention to detail are essential.
- Ability to quickly learn new techniques, think critically and work independently
- Good interpersonal, communication and problem solving skills
- Ability to work in a collaborative, team-oriented environment, and can clearly prepare and present reports of their work

MSKCC is an equal opportunity and affirmative action employer committed to diversity and inclusion in all aspects of recruiting and employment. All qualified individuals are encouraged to apply.

We offer an excellent salary and comprehensive benefits, including tuition reimbursement. Please visit our website at www.mskcc.org/jobs and apply on-line.

RUTGERS
University Human Resources

Rutgers University

Job Details

Job Title	LABORATORY RESEARCHER III
Position Number	12-003469
Posting Date	11/15/2012
Department	SAS-DLS-Cell & DNA Repository
Campus	Busch
Salary	Grade 04
Retirement System	ABP
Funding	Non-State funded
Work Week	37.5 hrs non-exempt
Job Description	Reports to the Lab Manager. Responsible for providing routine molecular biology support by developing and running protocols for both the Rutgers University Cell and DNA Repository (RUCDR) and Bionomics Research and Technology Center (BRTC). Repository wide sample management of both prospective and retrospective studies. Develops standard operating procedures and protocols that cover nucleic acid, genomic and proteomic storage applications. Performs bench work at an expert level and interprets and prepares data and inventory reports as needed. Implements quality control processes throughout various storage workflows and manages projects in order to achieve accurate results. Maintains associated instruments in good working order, including supply and consumable maintenance.
Job Requirements	Requires a bachelor's degree in life sciences or biology, molecular biology, or biochemistry, with experience in project management, and a minimum of two years practical bench experience, or an equivalent combination of education and/or relevant experience. Also requires good overall communication skills with internal team members and external clients. Requires a significant addition to current supervisory responsibilities and technological expertise to ensure quality control and assurance. Must have the ability to multi-task projects and judiciously evaluate priorities to consistently meet deadlines. Experience managing technical staff is required. Must

	have experience with nucleic acid extraction and purification, quality control, and downstream applications, as well as experience analyzing large data sets and workings in LIMS environment/databases. Must have working knowledge of biobanking concepts. The qualified candidate will also be able to work independently to solve technological and analytical problems. A master's degree in the related field and previous experience with molecular biology techniques using DNA, RNA, and protein preferred. Industry experience is also desirable. Experience performing molecular biology experiments including cDNA synthesis, microarrays, SNP genotyping, RT-RCR, basic cloning, Elisas, Western Blots, hybridization procedures, and other related assays are preferred.
Special Conditions	None

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AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

It is university policy to provide equal employment opportunity to all its employees and applicants for employment regardless of their race, religion, color, national origin, ancestry, age, sex, sexual orientation, gender identity and expression, disability, genetic information, atypical hereditary cellular or blood trait, marital status, civil union status, domestic partnership status, military service, veteran status, or any other category protected by law.

New Jersey First Act/Residency Law

Any individual newly hired by Rutgers after September 1, 2011 will be required to abide by the New Jersey First Act/Residency Law and establish a principal residence in New Jersey, unless their position is on the exempt list or they successfully petition for exemption based on critical need or hardship. New employees will have a full 365 days to establish such residence, from the effective date of hire. For additional information regarding this law visit the University Human Resources website at: http://uhr.rutgers.edu/jobs/working-rutgers/new-jersey-residency-bill

PUBLIC SAFETY INFORMATION

Information regarding public safety at Rutgers, The State University of New Jersey is available in the annual security report Safety Matters. For each of Rutgers' regional campuses, the report includes statistics for the previous three years concerning reported crimes that occurred on campus; in certain off-campus buildings or property owned or controlled by Rutgers University; and on public property within, or immediately adjacent to and accessible from, the campus. The report also includes institutional policies concerning campus security, such as policies concerning alcohol and drug use, crime prevention, the reporting of crimes, sexual assault, and other matters. "Safety Matters" is available online at: http://rupd.rutgers.edu/aboutsafe.shtml. A paper copy can be obtained at the RUPD headquarters on each campus or by emailing the APS Communications Director at clery@aps.rutgers.edu. The locations of the RUPD headquarters are: Camden Campus: 409 North 4th Street, Newark Campus: 200 University Avenue and New Brunswick Campus: 55 Commercial Avenue

Microbiology Laboratory Technologist

Mars Confectionery- US ,New Jersey,Hackettstown, (Greater New York City Area)

Job Description

Purpose of Role:

This position is a member of the Food Safety Team that makes complex risk based food safety decisions that have direct impact on the microbial quality of our products and processes. This position provides technical leadership and scientific expertise for microbiology programs and laboratories within the scope of the Mars Chocolate North America Regional Laboratory governance.

Under the supervision of the Regional Mars Chocolate North America Microbiology Manager, this position maintains processes that assure raw materials, manufacturing processes and environments are microbiologically safe for producing new and existing products. The job interprets sensitive and technical data for their potential impact on product microbiological safety and provides timely recommendations for the effective resolution of microbiological issues. This position is responsible for managing and maintaining the programs that ensure the credibility of data generated by the Mars Chocolate North America Regional Laboratory. As an R&D resource, this position requires project management and team leadership skills while working closely with Supplier Quality Assurance, Supply, Commercial, Quality Systems and Product/Process Development teams within the confectionery segment. Principal Accountabilities

- Serve as functional expert of ISO17025 Lab Management Standard of Mars Chocolate North America Regional Laboratory.
- Manage and maintain laboratory QC programs and documentation practices in compliance with Mars Global Lab Standard, IS017025 Lab Management Standard and Good Laboratory Practices (GLPs).
- Conduct microbiological sampling and analyses of food products/ingredients to deliver timely, accurate, and consistent results in a secure and confidential manner.
- Serve as auditor of both internal and external microbiological testing laboratories used by the Mars Chocolate North America region.
- Provide training to laboratory associates and key stakeholders on microbiological techniques and programs.

Key Functional Skills/Knowledge

- Expert laboratory skills to perform microbiological analyses and research. Competent and skilled in standard FDA BAM methodologies for pathogen detection and confirmation. Competent and skilled in standard FDA BAM methodologies for detecting and enumerating quality indicator organisms.

- Expert knowledge of Good Laboratory Practices (GLPs), ISO17025 Lab Management Standard and lab safety.

- In depth knowledge of food microbiology/food safety HACCP, GMPs, and microbiological sampling and test procedures.

- Effective written and oral communication skills, and able to present training materials and scientific research results to diverse, multi-level groups.

- Able to not only work independently, but also supervise the daily schedule of a team of analysts.

- Able to deal directly with suppliers, consultants, regulatory agencies and various technical or non-technical people internal and external of Mars Chocolate North America.

- Practice confidentiality protocol for sensitive data / results, understand all laboratory security requirements, and be able to operate all applicable computer programs including the Laboratory Information Management System (LIMS).

- Demonstrated ability to evaluate microbiologically sensitive business risks, and to define and communicate appropriate cost effective resolutions in a timely manner.

Minimum Qualifications

- 2 to 5 years of experience in an industry, regulatory or academic food testing laboratory. ·
- B.S. Degree in Microbiology or related field (e.g.,Food Science , Medical Technology , Biotechnology , Biology) is required.
- Successful Completion of Background and Substance Screen Preferred Qualifications – Experience in an ISO17025 accredited laboratory.

  For information on how we use data on the Mars.com site. please read: Data consent

Company Description

Headquartered in Mount Olive, New Jersey, U.S., Mars Chocolate is one of the world's leading chocolate manufacturers and employs more than 13,000 people across 110 sites worldwide. Our iconic brands include M&M'S®, SNICKERS®, DOVE®, GALAXY®, MARS®, MILKY WAY® and TWIX®. PRINCIPLES IN ACTION Being a market leader is as much about how we do things as it is about sales volumes. Mars Chocolate is committed to leading the industry in areas such as health and nutrition and sustainability. At the end of 2007, Mars became the first chocolate company to voluntarily stop advertising and marketing directly to children under age 12 worldwide. We are also the first global chocolate company to commit to annually sourcing all of our cocoa from certified sources by 2020. We currently have contracts in place to source 100,000 tonnes from each of the leading third-party cocoa certifiers — Rainforest Alliance and UTZ — by 2020. Since Frank C. Mars and his wife, Ethel, started making candy in their Tacoma, Washington, kitchen 100 years ago, we have learned a lot about cocoa. Yet, we do not

know all the facts surrounding its origins. Mars, Incorporated is leading efforts to identify the true history of chocolate and has published a book called "Chocolate: History, Culture and Heritage." Learn more about the history of chocolate making in America by visiting www.americanheritagechocolate.com.

Additional Information

Posted:	December 11, 2012
Type:	Full-time
Experience:	Not Applicable
Functions:	Research, Information Technology, Engineering
Industries:	Consumer Goods, Food & Beverages, Food Production
Employer Job ID:	HAC02087
Job ID:	4183267

Research Associate / Senior Research Associate - Antibody Discovery

B. ***Stem CentRx, Inc.***

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Location: South San Francisco, CA **Posted Date:** 12/26/2012 **Position Type:** Full time **Job Code:** 121226-AD **Required Education:** Bachelors Degree

Description

Located in South San Francisco, California, Stem CentRx is embracing new paradigms and technologies to develop novel and life-changing therapies for cancer. As part of a talented and multi-disciplinary team advancing an exciting new approach to drug discovery and development, the successful candidate will participate in all activities related to constructing humanized antibodies: sequencing of antibodies from hybridomas, molecular cloning, and some biophysical analysis of candidate constructs by a variety of assays including ELISA. Additionally, if there is interest, there may exist the opportunity to work on other aspects of biophysical characterization of antibodies such as epitope mapping.

Requirements

• BS/MS with 1-3 years of experience
• Proficient in molecular cloning strategies, RNA purification, and ELISA.
• Experience with one or more of the following skills is preferred: analysis of antibody sequences, RT-PCR, display technologies (eg. phage, yeast, ribosomal, etc) and flow cytometry.
• Demonstrated ability to multitask and meet deadlines in a fast-paced environment
• Motivated, organized and disciplined record keeping
• Great personality and excellent all-around communication skills

Compensation
We offer a generous salary/equity package, great benefits (including health, vision & dental) and the opportunity to participate in a 401(k) plan. Title and compensation will be commensurate with skills and experience.

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By being hired into one of our Entry-Level Manufacturing and Quality Operations jobs at Genzyme, you'll be a key member of the Genzyme team. Professionals in Entry-Level Manufacturing and Quality Operations careers come from a variety of backgrounds, bringing an assortment of knowledge and skills to every area of our business. Please click on your desired Entry-Level Manufacturing and Quality Operations job below to learn more about the exact qualifications. A job in Entry-Level Manufacturing and Quality Operations at Genzyme may be waiting for you!

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About Genzyme

Genzyme has pioneered the development and delivery of transformative therapies for patients affected by rare and debilitating diseases for over 30 years. We accomplish our goals through world-class research, collaboration with the global patient community, and with the compassion and commitment of our employees. With a focus on rare diseases and multiple sclerosis, we are dedicated to making a positive impact on the lives of the patients and families we serve. Genzyme's portfolio of transformative therapies, which are marketed in countries around the world, represent groundbreaking and life-saving advances in medicine. As a Sanofi company, Genzyme benefits from the reach and resources of one of the world's largest pharmaceutical companies, with a shared commitment to improving the lives of patients.

Genzyme Jobs > Entry Level Manufacturing and Quality Operations Jobs > Framingham Entry Level Manufacturing and Quality Operations Jobs

Job Opportunity

Quality Control Analyst I

Quality Control Analyst I-32015
Description
Genzyme has pioneered the development and delivery of transformative therapies for patients affected by rare and debilitating diseases for over 30 years. We accomplish our goals through world-class research, collaboration with the global patient community, and with the compassion and commitment of our employees. With a focus on rare diseases and multiple sclerosis, we are dedicated to making a positive impact on the lives of the patients and families we serve. Genzyme's portfolio of transformative therapies, which are marketed in countries around the world, represent groundbreaking and life-saving advances in medicine. As a Sanofi company, Genzyme benefits from the reach and resources of one of the world's largest pharmaceutical companies, with a shared commitment to improving the lives of patients. Learn more at www.genzyme.com.
Quality Control Analyst I -Night Shift
This Position is a night time operations 12 hour rotating shift (6:45 PM to 7:15 AM).
Department Description
Quality Control Microbiology supports manufacturing activities at Genzyme's Framingham Campus by detecting, quantifying, and identifying possible contaminants that may interfere with the quality of the product during the different stages of the manufacturing process. It aims to maintain a state of microbiological control in the Utility Systems and within the environmental where the manufacturing process is executed. It assesses the aseptic behavior of the personnel involved in these processes; and contributes to the guarantee that the end product will meet the pre-defined standards for safety, purity, identity and effectiveness.
Position Summary
Contribute to general operations and testing of the QC Microbiology laboratory. Work independently and under general supervision to conduct microbiological routine testing of environmental, critical utility, raw materials, in-process, validation samples and final products in accordance with SOPs and cGMP regulations. Review laboratory assay documentation for accuracy and timeliness, evaluation preliminary results; aid in the development of test methods and participate with the team to meet group goals and perform routine laboratory duties.
Core Responsibilities
· Collect and process samples in a timely manner, review laboratory7 assay documentation for accuracy and timeliness, evaluate preliminary results; aids in the development of test methods and participate with the team to meet group goals and perform routine laboratory duties.
· Perform Water, Steam, and Critical Utility collection as well as associated testing.
· Perform Biological Indicator Testing.
· Perform Environmental Monitoring.
· Perform Endotoxin Testing (Gel Clot and Kinetic Turbidimetric).
· Perform Bioburden Testing of In-Process products, buffers, and water.
· Receive manufacturing samples into the QC Lab as well as sample retain disposal.
· Troubleshoot assay and instrument problems with Laboratory Supervisor.
· Enter and review data in LIMS.
· Perform safety and operational lab audit.
· Perform general maintenance of lab equipment.
· Participate in writing and revisions SOPs, protocols.
· Assist in the development and optimization of testing methods.
· Maintain log books related to inventory and equipment.

· Ensure labs are clean and safe (in compliance with cGMP) and properly stocked.
· Make detailed observations in support of Alert, Action, and OOS result investigations.
· Participate in the qualification of equipment, methods, and processes.
· Participate and perform special studies & projects assigned to microbiology.
· Perform plate reading, streaking, gram staining, microbial identification.
· Perform routine Quality Control testing of in-proOcess and final products in a cGMP lab for release.
· Perform other additional job related duties as required.
· Practice safe work habits and adhere to Genzyme's safety procedures and guidelines.
˙ Key responsibilities may differ among employees with the same job title and may change over time, in accordance with business needs.

Leadership Qualifications

An ongoing commitment to conducting our global business according to the highest legal and ethical standards, and to continually pursue excellence in the development and delivery of all of our products and services. This includes:

· Adhering to all applicable laws and regulations of the places in which we conduct business, as well as our own Company policies and procedures.
· Being honest and treating people with respect and courtesy.
· Constantly striving to make Genzyme a great place to work, and a company respected for the quality of its people and products.
· Action as a role models for our fellow employees by acting responsibly, fairly, and honestly in our dealings and exercising sound judgment in performing our jobs.

Qualifications

Basic Qualifications

Associates degree and minimum of 0-2 years industry experience or Bachelor's degree in Life Sciences discipline.

Preferred Qualifications

· 1 year experience in a cGMP lab environment
· Working knowledge of Aseptic practices and technique.
· Proficient in Outlook and MS Work and Excel and lab based data management systems.

Special Working Conditions

· Must be able to lift 40lbs.
· Must be able to gown and gain entry into manufacturing areas.
· Occasional nights, weekends and holidays may be required.

Job : Quality
Primary Location : United States-Massachusetts-Framingham
Job Posting : Jan 15, 2013
Shift : Night Job / Third Shift
Job Type : Regular
Employee Status : Regular

Location Information

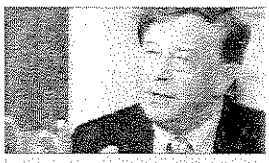
Framingham, MA

USA

Hear from our leadership today about Genzyme's tomorrow.

To learn more, visit our Genyzme Transformation site.

Scott Canute
President of Global Manufacturing and Corporate Operations
Discusses Genzyme's Global Manufacturing Mission



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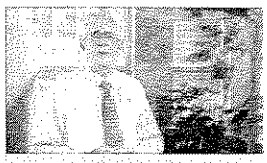
Chairman, President, and CEO
Hear from our leadership today about Genzyme's tomorrow.



Ron Branning
Vice President of Global Product Quality
Discusses Enhancing Quality at Genzyme

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By being hired into one of our Entry-Level Manufacturing and Quality Operations jobs at Genzyme, you'll be a key member of the Genzyme team. Professionals in Entry-Level Manufacturing and Quality Operations careers come from a variety of backgrounds, bringing an assortment of knowledge and skills to every area of our business. Please click on your desired Entry-Level Manufacturing and Quality Operations job below to learn more about the exact qualifications.
A job in Entry-Level Manufacturing and Quality Operations at Genzyme may be waiting for you!

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Genzyme Jobs > Entry Level Manufacturing and Quality Operations Jobs > Framingham Entry Level Manufacturing and Quality Operations Jobs

Job Opportunity

Manufacturing Technician Sr

Manufacturing Technician Sr-32059
Description
Genzyme has pioneered the development and delivery of transformative therapies for patients affected by rare and debilitating diseases for over 30 years. We accomplish our goals through world-class research, collaboration with the global patient community, and with the compassion and commitment of our employees. With a focus on rare diseases and multiple sclerosis, we are dedicated to making a positive impact on the lives of the patients and families we serve. Genzyme's portfolio of transformative therapies, which are marketed in countries around the world, represent groundbreaking and life-saving advances in medicine. As a Sanofi company, Genzyme benefits from the reach and resources of one of the world's largest pharmaceutical companies, with a shared commitment to improving the lives of patients. Learn more at www.genzyme.com.
This is a day rotating media postion
The Cell Culture Operations Department performs small and large scale cell culture operations, media preparation, equipment preparation, clean in place (CIP) and steam in place (SIP), and Preventative Maintenance of process equipment as part of a 24/7 large-scale therapeutic protein manufacturing facility.
Position Summary
This position is responsible for performing a variety of complex tasks under general guidance and in accordance with the manufacturing instruction set and current GMPs.
Core Responsibilities
· Practices safe work habits and adheres to Genzyme's safety procedures and guidelines.
· Demonstrates knowledge and understanding of GMPs & how they apply to specific responsibilities.
· Follows verbal and written procedures in operating production equipment and performing processing steps; accurately completes appropriate production documentation.
· Identifies, escalates and documents events that deviate from normal operation; participate as needed in investigations.
· Maintains cleanliness and orderliness of operational area.
· Stocks production area with supplies.
· May perform support function for more senior operators.
· Interacts with other support functions, such as Quality Assurance, Quality Control, Manufacturing Engineering, MTS, Validation, etc.
· Utilizes manufacturing knowledge to improve process operations and affect positive change.
Additional Responsibilities
· Small Scale Team
o Demonstrates general knowledge of mammalian tissue culture processes.
o Demonstrates general knowledge and practice of aseptic techniques.
o Provides daily monitoring of seed cultures including sampling and in process assays (cell counting).
o Cleans and builds equipment for manufacturing use including spinner flasks.
· Large Scale Team
o Demonstrates general knowledge of mammalian tissue culture processes.
o Completes tasks in support of large scale cell culture bioreactor operations.
o Provides daily monitoring of cultures and bioreactor processes including sampling and in process assays (cell counting).
o Demonstrates general knowledge of aseptic techniques.
o Performs PM, CIP, and SIP operations to prepare equipment for manufacturing operations.

· Equipment Preparation:
· Demonstrates ability to follow detailed instruction set in order to execute production activities.
· Demonstrates ability to follow detailed instruction set in order to execute production activities.
· Demonstrates ability to build, clean and sterilize equipment to support Media/Buffer Preparation, Purification and Cell Culture equipment preparation.
· Demonstrates knowledge of Autoclaves.
· Demonstrates knowledge of Clean out of Place (COP).
· Media Preparation:
o Demonstrates general understanding of gas and liquid filtration.
o Demonstrates understanding PM, CIP, and SIP operations to prepare equipment for Media Preparation operations.
o Supports a clean neat work environment.
o Demonstrates general understanding of application of sanitization practices.
Demonstrates ability to measure raw materials and operate basic Benchtop instruments.
An ongoing commitment to conducting our global business according to the highest legal and ethical standards, and to continually pursue excellence in the development and delivery of all of our products and services. This includes:
Adhering to all applicable laws and regulations of the places in which we conduct business, as well as our own Company policies and procedures.

· Being honest and treating people with respect and courtesy.
· Constantly striving to make Genzyme a great place to work, and a company respected for the quality of its people and products.
Acting as role models for our fellow employees by acting responsibly, fairly, and honestly in our dealings and exercising sound judgment in performing our jobs.
Qualifications
BASIC QUALIFICATIONS
High school diploma/GED with 1-3 years in a cGXP manufacturing environment, or Bachelor's degree with no prior experience.
PREFFERED QUALIFICATIONS
· Biotech Certificate or Associates degree with 1-3 years of experience in a cGXP environment, or Bachelor's degree with 1-2 years of experience.
· Effectively uses process automation systems to operate production processes (i.e. DeltaV).
· Experience in reviewing and creating controlled documents.
Familiarity with Deviation Management Systems (i.e. Trackwise).
Job : Manufacturing & Development
Primary Location : United States-Massachusetts-Framingham
Job Posting : Jan 16, 2013
Shift : Rotating
Job Type : Regular
Employee Status : Regular

Location Information

Framingham, MA

USA

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Scott Canute
President of Global Manufacturing and Corporate Operations
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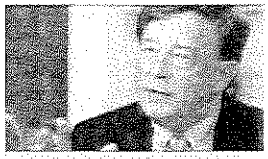

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Ron Branning
Vice President of Global Product Quality
Discusses Enhancing Quality at Genzyme

Administrative Assistant, Office of Clinical Research

Added 01/10/2013 New York, NY Admin Support Staff
Job ID: 3445476

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Memorial Sloan-Kettering Cancer Center is a world renowned organization dedicated to the progressive control and cure of cancer through programs of patient care, research, and education.

Provides administrative support to assigned divisions and managers within the Office of Clinical Research (OCR), including significant scheduling and calendar management. In conjunction with the Administrative Coordinator, oversees facility and front desk operations at 307 East 63rd Street. Coordinates travel documents for all OCR staff. Oversees the accurate completion and submission of all departmental financial documents. Writes for and designs the quarterly OCR Newsletter. Participates in special projects as assigned by the OCR's Administrator.
High School plus four years administrative experience required
Bachelor's degree plus two years administrative experience strongly preferred
Advanced Microsoft Office skills (Outlook, Excel, Word)
Excellent writing and editing skills

Monday – Friday, 9:00 am – 5:00 pm
307 East 63rd Street

MSKCC is an equal opportunity and affirmative action employer committed to diversity and inclusion in all aspects of recruiting and employment. All qualified individuals are encouraged to apply.

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Meet Breast Cancer Surgeon Lisa Sclafani

By Memorial Sloan-Kettering | Wednesday, January 16, 2013 2 comments

Dr. Sclafani, who practices at Memorial Sloan-Kettering Commack, wants newly diagnosed patients to leave her office with hope and with a plan of action for treating the cancer.

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About Biogen Idec

Biogen Idec (NASDAQ: BIIB) is a biotechnology leader that discovers, develops and delivers medicines to improve the lives of patients. As a company, Biogen Idec recognizes that cutting-edge science and medicines can address unmet patient needs to change the course of devastating diseases.

Founded in 1978, Biogen Idec is the world's oldest independent biotechnology company. Patients worldwide benefit every day from our industry-leading multiple sclerosis (MS) products. We have one of the strongest late-stage pipelines in the industry. In the coming years, we're working hard to bring new therapies to market for patients with MS, amyotrophic lateral sclerosis (ALS, or Lou Gehrig's Disease), hemophilia, and others.

With more than 6,000 employees, Biogen Idec is a truly global organization – generating revenue of more than $5 billion worldwide in 2011. In addition to our headquarters in Weston, MA, and our research operations in Cambridge, MA, we have world-class manufacturing facilities in North Carolina and Hillerod, Denmark and offices in Canada, Australia, Japan and throughout Europe. We also have a direct commercial presence in 29 markets, including the US, EU, Brazil, China and India, and a network of distribution partners in more than 70 additional countries.

Posting Title

Manufacturing Associate III

Job Description

Manufacturing is a key strength at Biogen Idec. The company's capabilities and capacity for protein manufacturing are world class in quality and scale.

The manufacturing team is responsible for the last leg of a long journey. This journey is difficult, expensive and can take well over a decade. The process begins in research and development and is ultimately transferred to Manufacturing, but Manufacturing is also involved at the development stage to ensure we can produce what we create.

Prior to product approval, our goal is to produce quality material to supply clinical trials. Once a product is approved by regulatory agencies, our job is to generate material to commercially supply patients across the globe.

The Manufacturing Associate performs and documents daily manufacturing operations in a cGMP environment that involves operation of process equipment, execution of validation protocols, creating/revising cGMP documents, and other assignments. The person is highly detail oriented with excellent documentation skills and good troubleshooting abilities. The Manufacturing Associate is skilled in the operation of all unit operations in their area, and (at level IV and above) is typically an area expert on at least one unit operation, and often leads others in the execution of manufacturing processes.

1. Executes manufacturing processing steps and/or manufacturing support activities, monitoring the process against the batch record, SLR and control system. Coordinates and/or leads process steps as required.

2. Documents/Records and Reviews cGMP data and information (including documentation of deviations) for processing steps and/or equipment activities, following standard operating procedures. Revises and/or creates documents as instructed. Key documentation includes batch records, SLRs, and equipment logbooks.

3. Investigations deviations, develops and implements corrective and preventative actions as required by supervisor.

4. Actively participates in training activities, managing their individual training plan. Trains other associates as required.

5. Executes validation protocols with minimal supervision/direction of others.

Location US-NC-Research Triangle Park

Job Category Biopharmaceutical Sciences (MFG)

Requisition Number 19097BR

Qualifications

Process Knowledge:
- Possesses strong technical understanding of equipment and procedures, and identifies potential process and equipment improvements. Understands the theory and concepts behind the process, including an understanding of the impact of own area on upstream and downstream activities.
- Knowledgeable on non-routine process occurrences. Recognizes potential process and equipment problems. Understands implications of test/process specifications, operating ranges, alert and action limits.
- Writes new and edits existing SOPs.
- Understands basic biotechnology processing – purpose of major unit operations and microbial control concepts.

Problem Solving:
- Anticipates potential problems and takes preventive action in consultation with supervisor.
- Recognizes non-routine problems, investigates and suggests potential solutions.
- Makes routine decisions based on experience. Identifies and suggests solutions to common, basic problems.
- Recognizes obvious problems and alerts supervision.

Communication:
- Effectively communicates concepts and ideas, in addition to facts, both with-in the department as well as cross-functionally.
- Strong oral and written and skills. Capable of writing basic reports and summaries.
- Good written communication skills. Clearly communicates process information and process issues with co-workers and supervision, and communicates in a timely manner.

Must be able to work day OR night shift (6am-6pm) rotation (includes every other weekend).

Education

Minimum Requirements:
-BA or BS with 0-5 years direct/related experience, or
-AA or AS with 1-7 years direct/related experience, or
-Certificate (i.e., Bioworks) with 3-9 years direct/related experience, or
-High School Diploma with 5-10 years direct/related experience

The level of this role will be determined by the overall qualifications of the candidate selected (i.e., Manufacturing Associate II, III, IV or V).

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Technician II

Institution:	Cornell University
Location:	Ithaca, NY
Category:	Admin - Laboratory and Research
Posted:	01/14/2013
Type:	Part-Time/Adjunct

Job:	Research
Organization:	Department of Horticulture
Schedule:	Part-time
Job Type:	Standard
Overtime Status:	Non-exempt
Contact Name:	Joaquin Armando Cuevas
Minimum Hire Rate:	Technician II
Level:	Contract College

Cornell University

Description:

Technician II

Term Appointment (Band B)

Department of Horticulture

Cornell University

Ithaca NY

The only Horticulture Department in the Ivy League, our faculty, staff and students are working to shape the food systems and landscapes of today and for the future. Our faculty includes more than 40 scientists working across New York to make discoveries and share knowledge about fruits, vegetables, and landscape plants. They are called on by farmers, golf course managers, urban foresters, government officials and many others to solve problems around the globe.

Research and outreach associated with climate change adaptation and mitigation in the agriculture sector are an increasingly important societal need and are an important component of the sustainability efforts of the Department of Horticulture, CALS, and the university. This position will provide technical support to the program of Dr. David Wolfe and his projects focused on soil carbon assessment and greenhouse gas emissions in agroecosystems. The results of these projects will provide farmers, policy-makers, government agency personnel, and other stakeholders with new tools for management and accounting of soil carbon and greenhouse gas emissions in vegetable, fruit, dairy, and field crop production systems.

The main duties for this position include but are not limited to:

Provide technical support involving field soil sampling at research and commercial farm sites, laboratory analyses of soil samples, and inventory and data management.

Lab work will involve preparation of soil samples, chemical analyses of samples following specific soil carbon and other analysis protocols with accuracy and repeatability, labeling and storing samples, maintaining inventory of samples, equipment and chemicals, and assist in maintaining inventory and ordering supplies and chemicals as needed.

Contribute to cleaning and maintaining lab equipment, and be responsible for understanding and adhering to field and lab safety protocols.

Work closely with supervisors (lab manager and professor) and others in the lab group to improve accuracy and efficiency of lab and field methods, and accomplish field and lab tasks in a timely fashion with equitable sharing of the work load.

Assist in training of undergraduates in field and lab protocols and safety issues. Data management will involve maintaining lab records, and data entry into Excel and other software with guidance and consultation of the supervisor, and assist in organization of final data for reports.

Occasional travelling for sampling required.

This is a one year term appointment with possibility of extension, dependent on successful performance evaluations and continuation of funding. This is a part-time position 30 hours per week.

Qualifications:

Required Qualifications:

Formal training beyond a high school diploma of 1 to 2 years, Associates degree, 2 years of college coursework or equivalent; more than 6 months and less than 1 year experience. Prior experience working in a laboratory required.

Must be able to work successfully in a team-oriented environment.

Excellent interpersonal communication and organizational skills. Strong attention to detail required.

Ability to develop effective working relationships with a wide variety of students, faculty and staff.

Ability to manage multiple tasks simultaneously. Knowledge of and experience with basic computer programs including Word, Excel, and email.

Ability to keep the equipment, materials, and lab organized.

Must be able and willing to occasionally work irregular hours (some evenings and weekends) within the standard workweek.

Must possess and maintain a valid NYS driver's license.

Diver's check will be required

Preferred Qualifications:

Bachelor's degree in agricultural or environmental sciences preferred.

One year of work experience in addition to classroom experience with field soil sampling and soil laboratory analyses.

Experience with data entry and management with Excel.

Background check may be required. No relocation assistance is provided for this position. Visa sponsorship is not available for this position

Cornell University is an innovative Ivy League university and a great place to work. Our inclusive community of scholars, students and staff impart an uncommon sense of larger purpose and contribute creative ideas to further the university's mission of teaching, discovery and engagement. Located in Ithaca, NY, Cornell's far-flung global presence includes the medical college's campuses on the Upper East Side of Manhattan and Doha, Qatar, as well as the new CornellNYC Tech campus to be built on Roosevelt Island in the heart of New York City.

Diversity and inclusion have been and continue to be a part of our heritage. Cornell University is a recognized EEO/AA employer and educator.

College of Agriculture and Life Sciences

Developing Leaders. Improving Lives, Shaping the Future ...

Application Information

Contact: Joaquin Armando Cuevas
Cornell University
Online App. Form: https://cornellu.taleo.net/careersection/10164/jobdetail.ftl?lang=en&src=JB-10360&job=328009

More Information on Cornell University

Institutional Profile
Current openings for Cornell University on HigherEdJobs.
Jobs at Cornell
Cornell University Home Page

Cornell University is an equal opportunity, affirmative action educator and employer.

College Laboratory Technician Department of Sciences

Institution:	CUNY John Jay College
Location:	New York, NY
Category:	Admin - Laboratory and Research
Posted:	01/11/2013
Application Due:	02/09/2013
Type:	Full Time

College Laboratory Technician Department of Sciences
Job ID: 7418
Job Title Name: College Laboratory Technician
Contract Title: College Laboratory Technician
Position Type: Regular/Full-Time
Closing Date: February 9, 2013
Compensation: $36,795 - $53,362
College website: http://www.jjay.cuny.edu

GENERAL DUTIES
Performs highly-skilled laboratory functions and other technical duties in support of coursework.

- Sets up, maintains, and organizes student laboratories
- Assists students with setting up experiments and other learning exercises, and with the use of equipment and materials
- Maintains appropriate safety and hygiene standards
- Maintains required documentation related to laboratory activities
- Manages equipment and materials inventories.

Job Title Name: College Laboratory Technician
CONTRACT TITLE
College Laboratory Technician
FLSA
Non-exempt
CAMPUS SPECIFIC INFORMATION
In addition to the general duties, the College Laboratory Technician will also be required to:

- Assist in procurement, recordkeeping, and distribution of laboratory supplies and equipment.
- Prepare chemical reagents for laboratory exercises and experiments.
- Assist faculty course coordinators in the design and revision of laboratory exercises.
- Comply with and enforce departmental policy and all local, state, and federal health and safety regulations.

John Jay College of Criminal Justice, a senior college of the City University of New York (CUNY), is an internationally recognized leader in educating for justice, committed to the advancement of justice and just societies. It is a public liberal arts college that enriches the entire learning experience by highlighting themes of justice across the arts, sciences, humanities, and social sciences. Located steps from Lincoln Center at the cultural heart of New York City, the College offers bachelors and masters degrees and participates in the doctoral programs of the Graduate School of the City University of New York. John Jay College is also recognized for serving a broadly diverse student population. Under the leadership of its fourth president, Jeremy Travis, John Jay College has experienced unprecedented faculty hiring, an expansion of its curricular offerings, and the opening in 2011 of a new 600,000 square foot building complete with a black-box theatre, state-of-the-art lab space for students and faculty, a moot courtroom, and a variety of virtual learning settings. As evidenced by so many on-going developments, the College offers its many new faculty and staff the opportunity to shape the future of their institution.

MINIMUM QUALIFICATIONS
High School Diploma with a minimum of four years' related experience. Additional education may be used to meet the experience requirement: an Associate degree may be substituted for two years experience, and a Bachelor's degree may be substituted for four years experience.

OTHER QUALIFICATIONS
Preferred Qualifications include:

- Bachelor of Science degree (or its foreign equivalent) in a wet laboratory-based (hard science) discipline such as chemistry, biology, physics, or similar with work experience in a scientific laboratory setting (only degrees in STEM disciplines shall qualify)
- Working knowledge, training, and experience in laboratory safety, hazardous waste management, and/or chemical hygiene
- Substantial experience in diverse scientific settings, including the private or industrial sector, government laboratories, and academic institutions that will add to our collective wisdom and experience

Areas that we are searching for include: Forensic Science and Criminalistics, Quantitative/Analytical Chemistry, Organic Chemistry, Biochemistry, Physics, Biology, and Environmental Science. Master's degree or graduate coursework in a laboratory-based discipline is a plus.

COMPENSATION

$36,795 - $53,362

BENEFITS
CUNY offers a comprehensive benefits package to employees and eligible dependents based on job title and classification. Employees are also offered pension and Tax-Deferred Savings Plans. Part-time employees must meet a weekly or semester work hour criteria to be eligible for health benefits. Health benefits are also extended to retirees who meet the eligibility criteria.

HOW TO APPLY
To apply please visit: www.jjay.cuny.edu/jobs

CLOSING DATE
February 9, 2013

JOB SEARCH CATEGORY
CUNY Job Posting: Managerial/Professional

EQUAL EMPLOYMENT OPPORTUNITY
We are committed to enhancing our diverse academic community by actively encouraging people with disabilities, minorities, veterans, and women to apply. We take pride in our pluralistic community and continue to seek excellence through diversity and inclusion. EO/AA Employer.

Application Information

Contact: CUNY John Jay College
Online App. Form: http://www.jjay.cuny.edu/jobs