

## Oklahoma City Community College

Program Review Self Study Year: 2012-2013

Division of Science and Mathematics

Associate in Applied Science in Biotechnology Research Assistant (115)

Certificate of Mastery in Biotechnology Research Assistant (119)

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### I. Introduction

This section should reference the general process of the review and any unique features of the review (such as the use of outside consultants or conducting the review in relation to an accreditation visit).

If the program has been reviewed previously, this section should include a brief summary of prior recommendations and how they were addressed.

**The program was last reviewed in October 2007**

#### **Prior recommendations:**

1. Intensify recruitment efforts for the program.
2. Seek sources in and outside the college for new equipment as needs arise.

The visibility of the program outside of the college has increased in part because of its graduates who are now working in the workforce and are ambassadors of the program. The Moore Norman Technology Center Biotechnology program for high school students has produced a small pipeline of students entering into the biotechnology program at OCCC. The visibility of the biotechnology program within the college has increased somewhat due to the prominent display of poster featuring the biotechnology industry internship work of the program students. Recruitment/advising by science faculty who address a larger number of students in biology and microbiology classes have resulted in more students inquiring about the program. Overall, between 2007 and 2012, enrollment

in the major biotechnology class has doubled from 4 to an average of 8 students.  
Several pieces of aging equipment had to be replaced over the last couple of years.  
Funds from the Carl Perkins grant for workforce prep programs were used to acquire the rather expensive instrumentation.

## II. Executive Summary

The Executive Summary will include the program's connection to the institution's mission, program objectives, and the strengths and areas for improvement of the program. It will also include the key findings and recommendations of the internal or external reviews with regard to the Program Review Principles and Program Review Criteria.

Since the inception of the biotechnology program at OCCC in 1997, 74 students have completed the requirements for the AAS or Certificate of Mastery in Biotechnology. Over 60% of these students are working or have worked in the biotechnology field in Oklahoma following graduation, another 34% have continued their education to obtain BS or higher degrees, the majority of them at universities in Oklahoma. That means that 94% of the program graduates have directly contributed to the economy in the state of Oklahoma through their employment in this highly technical field or have continued their education and will most certainly contribute to the workforce in this state upon their graduation with their higher degrees.

The biotechnology program at OCCC is one of only two such programs (the other is located at Tulsa Community College) that provide this type of workforce preparation in Oklahoma. It is significant to point out that we have seen an increase in students who have a previous BS degree in a related field who are enrolling in biotechnology classes to obtain the intense laboratory skills training that is unique to our program. This further underscores the increasing importance of our program in providing students with BS and even MS degrees with marketable skills which they did not receive in their previous degree programs.

The biotechnology industry in the Oklahoma City area continues to look toward our program graduates to hire laboratory technicians for their companies. Furthermore, excellent communication exists between the industry and the director of the biotechnology program and faculty to ensure the program curriculum meets the needs of the biotechnology industry and other local places of employment for laboratory technicians.

Internally, the academic outcomes assessment committee at OCCC has reviewed the assessment plan and report of the biotechnology program and determined that the student learning outcomes and measurements are well-defined and appropriate.

The number of program graduates, though relatively low, is in good balance with the demands for a workforce at this level by the relatively small biotechnology industry, thus the high employment rate of our program graduates. Recruitment efforts within the college are continuing to ensure the demands for a trained workforce in biotechnology are being met.

An important aspect of the biotechnology program are the techniques and technology used in the local industry and other places of employment. In order for our program students to be competitive in the employment market, the equipment they train on and the techniques they are learning have to be current and applicable to the needs of the local industry. Thus it is imperative that as new technology is being considered, developed, and implemented by the local industry, our program faculty and curriculum stay abreast with the needs of the local biotechnology industry and adjust to and incorporate changes in the curriculum, equipment, and training of the students.

Therefore we plan to meet on a regular basis, and no less than twice a year, with biotechnology industry leaders, researchers, former students who are employed in the field, and representatives of the Oklahoma Bioscience Association to discuss technology trends in the industry and research labs and assess future needs by the companies. The feedback and information from these meeting will drive curriculum development in the major biotechnology classes.

### III. Analysis & Assessment

This section will include a complete review and analysis of the Program Review Criteria based on the internal or external team's review. It will also assess developments since the last program review in the context of the current recommendations of the internal review and any recommendations.

#### A. Centrality of the Program to the Institution's Mission

An assessment and written analysis as to the centrality of the program to the institution's mission and in the context of the institution's academic plan are required. The purpose of the mission of an institution is to indicate the direction in which the institution is going now and in the future. The mission defines the fundamental reason for the existence of the institution.

Together with the planning principles and goal statements, the mission reveals the philosophical stance of the institution with respect to education and learning while at the same time providing a framework for the maintenance of institutional integrity and development.

Describe how the program is central to the institution's mission:

The OCCC Mission and Vision Statement is:

**OCCC provides the people of Oklahoma and our community with broad access to certificates of mastery, associate degrees, community education, and cultural programs of exceptional quality, empowering our students to achieve their educational goals and our community to thrive in an increasingly global society.**

#### **Vision and Values**

OCCC aspires to be one of the most significant community colleges in the nation -- known for the amazing success of our students and for our prominent role in creating our community's future.

OCCC strives to achieve its mission and ENDS and fulfill its vision by operating in a culture that is committed to:

- **Innovation:** Creative and forward-thinking
- **Integrity:** Honest, ethical, and respectful to all
- **Diversity:** Embrace and appreciate the value of differences
- **Stewardship:** Wise and efficient use of resources
- **Accountability:** Data-driven evidence of mission accomplishment

With the biotechnology program, OCCC provides its students access to high quality technology training in a field that is growing in the state of Oklahoma. This is in direct support of OCCC's stated mission.

The biotechnology program students have been very successful in obtaining employment as well as in continuing their education, thus contributing to an important field and economic development in the state of Oklahoma. The program uses "best practices" of the industry and includes training in the ethical conduct of research thus supporting a culture of integrity amongst its students.

Resources within the college and from external sources are being used to ensure the quality education and training of the biotechnology program students. The resources to the biotechnology afforded by OCCC, in the form of general support technology and library collections are also accessible also by other college entities. The dedicated space of the biotechnology laboratory and the equipment needed to provide high quality training are also available for individual faculty-supervised student research projects. Expensive high-technology equipment needed for student

training was purchased through grants for federal workforce preparation. State funds have been obtained for internship stipends to support the students during their on-site biotechnology industry internship, which places them directly into the facility of potential employers.

The biotechnology outreach program to high schools across the state also helps high school science teachers with their science curriculum and thus provides high school students in the state of Oklahoma with additional hands-on advanced technology laboratory activities to support their science education, making them competitive nationwide for college education.

## **B. Vitality of the Program**

Vitality of the program refers to the activities and arrangements for insuring its continuing effectiveness and efficiency. To maintain its vitality and relevance, a program must plan for the continuous evaluation of its goals, clientele served, educational experiences offered, educational methods employed, including the effective incorporation of technology, and the use of its resources. This vital principle or force can best be observed by examining the past and present initiatives to insure the vitality of the faculty, students, and program.

### **1. List Program Objectives and Goals**

- Provide courses that give students marketable skills for the biotechnology industry.

*Student outcomes show the success of our program as of the 80 program students that have completed the degrees since the inception of the program 45 are known to have worked or are currently working in the field as technicians, two went on to become science teachers after obtaining a B.S. degree, two went onto obtain an M.S. degree in genetic counseling, four entered into Ph.D. programs and have since earned their Ph.D.s (one each at OUHSC, OU-Tulsa, Boston University, University of Washington), nineteen students went directly to a four-year degree program. Furthermore, since 2007 ten out of 38 students entering the biotechnology program (26%) came to the program with a BS degree in a related field, seeking to obtain hands-on laboratory skills and networking that was amiss from their previous educational experience.*

- Develop internship experiences for students.

*Since the inception of the biotechnology program, an industry internship has been a required part of the program. Partner companies within the greater Oklahoma City area have come to expect highly skilled interns from the program who can contribute to their company immediately with very little basic training. We have had funding for the internship experience by OCAST which provided the students with a stipend for the 8 week internship. Because of that funding, students can focus entirely on their internship.*

- Provide student support and advising and maximize interaction with students.

*Our small classes and the rapport we develop with our students over long lab periods for an entire year guarantees that we connect with our students. Program graduates return to provide their internship and employment prospective to current students in the program. In addition, we sponsor a student biotechnology club, sponsoring speakers and field trips to biotechnology/ research entities.*

- Continuously improve and update the program curriculum.

*As technology and area biotechnology changes, and based on feedback from the programs advisory committee, curriculum changes have been implemented. Minor changes included adjusting credit hours between key program courses to allow more in-lab time, revising pre-requisite courses to ensure that students have an increased success rate, adjusting course*

*content to provide students with more applicable/marketable skills and knowledge.*

- Continuously seek to upgrade program equipment.

*With changing technology and industry trends, new equipment has been purchased as needed over the past several years, to provide hands-on training on equipment program students will encounter in area biotechnology laboratories. Funds from the Carl Perkins grant for workforce prep programs have been used to acquire the more expensive instrumentation.*

- Work with other college departments to support student learning: library, instructional technology, science center, counseling, student life.

*The library has selectively increased its holdings in molecular biology and biotechnology since the program began. We have worked with instructional technology to produce a video for advertising/highlighting the program on television/college TV monitors, and a web site for the program ([www.occc.edu/biotech](http://www.occc.edu/biotech)). We have added safety videos from the Howard Hughes Medical Institute to the science center. We have worked with advising to inform students about the program. We have sponsored a student biotech club.*

- Provide professional development opportunities for program faculty.

*Dr. Fabiola Janiak-Spens, who has been the Director of Biotechnology Program since January 2007, and Dr. George Risinger, who also teaches 2000 level biotechnology course, have attended professional development and networking workshops each year.*

- Write grants to enhance program resources.

*We have obtained OCAST grants to support student internships. Specifically, for the past 6 years, Dr. Fabiola Janiak-Spens, together with industry partners as co-applicants, has been awarded three successive two-year grants from OCAST.*

## 2. Quality Indicators

Quality indicators may vary by institutional mission; however, institutions should measure the efforts and quality of their programs by: faculty quality, ability of students, achievements of graduates of the program, curriculum, library, access to information technology resources including efficiencies and improved learner outcomes through appropriate use of this technology and appropriate use of instructional technology to achieve educational objectives, special services provided to the students and/or community, and other critical services.

As appropriate, institutions should evaluate the program against industry or professional standards utilizing internal or external review processes. Institutions must provide specific documentation of student achievement. Such documentation should include programs outcomes assessment data

- a. The program's goals for student learning outcomes are clearly stated for each educational program and make effective assessment possible. List of the student learning outcomes.

- Graduates of the Biotechnology Program will be proficient in aseptic technique.
- Graduates of the Biotechnology Program will be proficient in calculating and making accurate laboratory solutions and dilutions.
- Graduates of the Biotechnology Program will be proficient in following protocols and standard operating procedures (SOPs).
- Graduates of the Biotechnology Program will be conscientious in learning and practicing workplace safety rules.
- Graduates of the Biotechnology Program will be proficient in keeping a legible and accurate scientific notebook in compliance with worksite regulations.
- Graduates of the Biotechnology Program will exhibit the scientific work ethic, which includes honesty, punctuality, teamwork, reliability, attention to detail, and self-motivation to learn.
- Graduates of the Biotechnology Program will be able to conduct and communicate a laboratory research project.

Well defined the criteria for measurement and how the criteria were used in the program.

The biotechnology internship is a 320-hour (8 week full-time) workplace experience during which biotechnology program students who have completed all required classes work in biotechnology companies or research institutions. Students work under mentorship of a site supervisor. At the end of the internship, supervisors submit an evaluation of the intern to the director of the biotechnology program. These evaluations serve as direct feedback to the biotechnology program.

With regard to measuring the student learning outcomes listed above, internship supervisors will rate all program students as "competent" or "exceeded expectations" on this item of the supervisor evaluation form.

A copy of the biotechnology student internship supervisor evaluation has been attached.

The evaluation, results, and recommendations based on the criteria used.

The supervisor evaluations and additional comments from the forms are being assessed by the biotechnology program faculty and, if deficiencies in student learning are apparent, student skills training within the biotechnology curriculum are adjusted as needed. No deficiencies have been noted by student internship supervisors in the past 5 years.

General Education requirements represent just over sixty percent of each Associate of Science or Associate of Arts degree, making the careful assessment of these broad competencies OCCC considers essential for all graduates very important.

**Strategy:**

The General Education Committee will create six interdisciplinary teams with members from multiple divisions. Each team will consist of five members with two members specifically teaching in one of the General Education Core Areas. Also, at least one team member will be a representative of the General Education Committee.

Twice a year these teams will evaluate one hundred artifacts from students having attained at least 36 hours of General Education Courses from OCCC. Reports, recommendations, and actions created from the General Education Assessment Process will be stored on the General Education Committee Website.

Evidence should be presented that shows a systematic review of the curriculum is conducted regularly. This review should indicate how the general education competencies are being met:



## **General Education Assessment Plan**

### **Objective:**

To assess and recommend actions for the general education component of Oklahoma City Community College's curriculum.

### **Method:**

Developed rubrics will provide common criteria for assessing "artifacts" gathered from various courses. Artifacts may include but are not limited to recorded performances, PowerPoint Presentations, essays, lab reports, research projects, service-learning projects, or any assignment preexisting in a faculty's course.

Nevertheless, the underlying principle of this method is (1) to reduce the intrusive nature of assessment within faculty courses, (2) to create a real environment of student performances within a classroom setting instead of a contrived environment of a forced examination (i.e. CAAP exams not counting for a classroom grade), and (3) to collect artifacts already designed and administered by our professional faculty at OCCC.

### **Data Collection:**

The Office of Institutional Effectiveness will identify each semester students completing at least 36 credit hours in General Education Courses.

### **The General Education Core**

General Education at Oklahoma City Community College is an integral component of each student's experience. Every student receiving an Associate Degree (AAS, AA, or AS) must complete at least one course from each of the following areas, indicating a general understanding of that area.

- I. Human Heritage, Culture, Values
- II. Public Speaking
- III. Writing
- IV. Social Institutions
- V. Mathematical Methods
- VI. Scientific Methodology

### **Program Response to General Education Assessment Data**

Provide Evidence that shows a systematic review of the curriculum is conducted regularly. This review should indicate how the general education competencies are being met.

The AAS in Biotechnology degree program includes 20 credit hours of general education classes, providing education in all key areas, including scientific methodology (General Chemistry I), mathematical methods (Introduction to Statistics), and writing (English Composition). OCCC's General Education Assessment Results from FY 2012 indicate that in the areas of particular importance for the biotechnology program students training, namely math, writing, public speaking, and scientific methodology, the institutional pass rate is (just) slightly above the goal of 70%. In order for biotechnology program students to be successful in the workplace they have to be especially competent (100%) in laboratory math applications, and effectively communicating their laboratory activities and results in oral and written form. The biotechnology program students are evaluated by the internship supervisors in these key areas as well.

The curriculum in all biotechnology classes is continually reviewed and revised to incorporate classroom and laboratory activities to support and improve student general education outcome

goals as well as biotechnology program specific educational goals.

The following biotechnology class activities are examples designed to support and improve general education outcome goals.

1000 level classes:

BIOT 1011: public speaking - presentations to class about online research findings based on several different homework assignments.

2000 level classes (BIOT 2823, BIOT 2843, BIOT 2933, BIOT 2942, BIOT 2921):

Writing, mathematical methods, scientific methodology

Within the core biotechnology classes the curriculum includes and assignments are given and graded that include conclusion writing (scientific method, writing) as well as application of calculations commonly used in biotechnology (mathematical methods). Students are also asked to prepare and present to the class a powerpoint presentation about a specific topic in the field of biotechnology during BIOT 2942 (public speaking).

All these activities serve to prepare the program students to not only use their learned hands-on skills but also to be able to effectively communicate their findings orally and in writing and have strong laboratory calculation math skills.

b. The program values and supports effective teaching.

### **Faculty Performance Review and Evaluation**

Faculty will be evaluated on the basis of the established standards of performance and objectives established in the person's contract and any subsequent memorandums of agreement established for the position/person. Faculty are defined as employees who primarily perform teaching and instruction-related duties and who are employed on the basis of a written contract setting forth the duties to be performed and the compensation to be paid. The performance appraisal for each faculty member will be conducted by the Division Dean or Director as appropriate.

### **Course and Faculty Evaluation**

The Student Input on Instruction process is a means of gathering student perceptions of instruction at the college. The results are intended to be used by faculty as means of identifying ways to improve instruction. A copy of the questionnaire may be found in the appendix of this document. Up to three (3) questions, unique to the course or section, may be created for inclusion as optional questions. The forms and supportive instructions will be available to students online during the 8th, 9th, or 10th week of 16-week courses or the 5th or 6th week of eight-week courses.

c. The program creates effective learning environment.

The biotechnology program has a dedicated laboratory space, 1B6 as well as a lecture/computer room (1C7) which also provides space for some of the larger equipment. This space is used only for program courses since it contains a lot of expensive and fragile equipment. However, we also use the space for biotechnology outreach to high school classes and for teacher workshops. The laboratory is more than adequately equipped but the space remains small given the large amount of equipment that program students use. In addition to the dedicated laboratory, our program students use the four autoclaves and the ice-maker that are shared with the biology department.

The major large equipment for the biotechnology program includes among others: 4 autoclaves, centrifuges, a laminar flow hood, a CO<sub>2</sub> incubator, sonicator, incubator, shaker-incubator, 2 thermal cycler (PCR) machines, a real-time PCR machine, a High Pressure Liquid Chromatography (HPLC), a low pressure chromatography system, 5 spectrophotometers, a plate reader, a water purification system, 3 microscopes, two -20°C freezer, a -80°C freezer, 3 balances, a gel documentation system, and two 3-Liter bioreactors. All this equipment has been purchased since the program inception in 1998 and is updated and added to yearly as needed to stay on the forefront of technology. The biotechnology program has its own adequate annual budget to provide for replacement chemicals, reagents, and supplies.

Each program student has his/her "own" 4-foot long lab bench space and access to dedicated small laboratory equipment to maximize individual training and learning.

d. The program's learning resources support student learning and effective teaching.

The library staff has worked with the program faculty to obtain many laboratory and text items since the program's inception. The librarians continue to update and improve resources supporting the program. The librarians continue to update and improve resources the OCCC library provides, keeping in mind that Biotechnology is a technical program.

This is the second program review of the Biotech program. The introductory survey course has an average enrollment of seven to twelve students and there are about 5 to 8 students enrolled in majors (2000 level) courses. Dr. Fabiola Janiak-Spens, Director of Biotechnology since January of

2007, and two other faculty members teach. No curriculum changes are currently planned.

Students have assignments involving the Library which require them to use Internet resources and books. Students have a short library orientation and have not expressed any trouble finding materials. Students need to come up with subject related topics and do research on those topics. They do need to learn how to find credible sources. Faculty have put books, articles and other items on Reserve for student use. The overall collection is meeting faculty professional needs.

The Library's array of resources --both online and in other formats --continues to grow and evolve. Currently about 120 books support the biotech program. Items supporting the Biotechnology program are located in call number areas TP 248, QH 400-455 and HD 9999.

Professors have recommended the majority of biotech titles in the collection. Genetics and molecular biology are subject areas that need to be emphasized in building the circulating collection. The professor recently recommended adding more books on biofuels, gene therapy, and genetically modified food.

The OCCC Library now has several means providing visual resources in support of coursework.

For example, the Library provides access to Films on Demand, an online streaming video service, via the Library website. FoD is multi-disciplinary. Its thousands of complete films, as well as convenient short clips, are searchable by discipline, topic and title. Any quick search reveals many biotech films and clips, which could be used to give context or stimulate a class discussion.

Now when someone needs information from periodical articles, that person is most likely to use Library's comprehensive online article databases such as EbscoHost. Ebsco currently provides access to articles a variety of biotech periodicals, as well as vast numbers of articles on biotech related issues that are published in other scientific and popular magazines. Also, the biotechnology professors suggested two useful new subscriptions to consider adding: The Scientist (0890-3670, monthly) and Biotechniques (monthly).

Librarians are committed to supplying good resources for the Biotechnology program. The Library has a strong budget and is almost always able to acquire items recommended by faculty members.

- e. The institution's curricular evaluation involves alumni, employers, and other external constituents who understand the relationship among the course of study, the currency of the curriculum, and the utility of the knowledge and skills gained.

OCCC has established specific curriculum patterns for transfer programs leading to the Associate in Arts (A.A.) or Associate in Science (A.S.) degrees. Describe program coordination efforts, partnerships and relationships with transfer institutions.

NA

- f. The organization learns from the constituencies it serves and analyzes its capacity to serve their needs and expectations.

- Effectively use the Biotechnology Program Advisory Board to keep the program relevant to the needs of the biotechnology workplace.

*Minutes of recent (2011 and 2012) Advisory Board meetings have been attached. Additionally, feedback from biotechnology internship supervisors is continuously considered to ensure the training within the biotechnology program reflects the needs and expectations of the biotechnology industry.*

- Work with area high schools and vocational-technical schools to promote careers in biotechnology to students and teachers.

*We are working with Moore Norman Technology Center's (MNTC) High School Biotechnology Program and provide transfer credit for the Survey in Biotechnology class for their students. Dr. Fabiola Janiak-Spens is on the Advisory Board of the MNTC Biotechnology Program. High school teacher workshops are held twice a year to provide technology training and support, science laboratory activities, and supplies to high school teachers and thus to high school students.*

- Make and maintain contacts with potential employers to inform students about job opportunities and employers about potential employees.

*Our main contacts with potential employers are through our Advisory Board and through our internship sites. However, we also attend local gatherings and receptions of the local biotech community, as represented by the Oklahoma Biotechnology Industry Organization ([www.okbio.org](http://www.okbio.org)).*

- Participate in local, regional, and national conferences and organizations in order to promote OCCC and its biotechnology program and our contribution to economic development.

*The director of the biotechnology program has participated at various meetings by the Oklahoma Biotechnology Industry Organization. Our students have presented posters of their internship research projects at Research Day for Regional Universities. The director of the biotechnology program, Dr. Fabiola Janiak-Spens has been participating in the annual national meeting of Bio-Link. Bio-Link is the Next Generation National Advanced Technological Education (ATE) Center of Excellence for Biotechnology and Life Sciences. The ATE program was created to improve and expand educational programs that prepare skilled technicians to work in the high-tech fields that drive the U.S. economy.*

- Work with other college departments to enhance program success: biology, chemistry, public relations, admissions and recruiting, counseling, physical plant.

*We have good working relations with all these college departments to help accomplish our program goals.*

- Work with higher education institutions to promote the program and work toward articulation

agreements.

*Moore-Norman Technology Center is offering a high school biotechnology program. We have established a cooperative alliance agreement that permits students to transfer the Survey in Biotechnology class to our program. Several students from the MNTC program have entered and graduated from the OCCC biotechnology as a direct result of this connection. Annually, the director of the MNTC biotechnology program facilitates a visit of the high school students in her program to OCCC and the biotechnology program here.*

- Maintain and improve the biotechnology program web site.

*Our program web site is regularly updated: [www.occc.edu/biotech](http://www.occc.edu/biotech). Many potential new employers who are unfamiliar with our program and who are seeking skilled laboratory technicians “discover” the program through the website. Likewise, potential students learn about our program through the website.*

### 3. Minimum Productivity Indicators

The following are considered to be the minimum standards for degree program productivity (averaged over five years). Programs not meeting these standards may be identified for early review as low producing programs. Institutions will be notified of programs not meeting either one of the two standards listed below and other quantifiable measures in this section.

- a. Number of degrees conferred (averaged over five years, minimum standard: AA/AS/AAS 5)

#### 3.8 (AAS - 2.8 and Cert - 1)

Three students during the 5 years that are considered for this statistics did not file for graduation during that time, however, all had completed their Certificate in Biotechnology degree requirements. They have since applied for graduation. This would bring the five year Certificate average to 1.6.

The overall average, when including the three students mentioned above, would then increase to 4.4.

- b. Number of majors enrolled (averaged over five years, minimum standard: AA/AS-25 AAS-17)

61.2 (AAS), 6.2 (Cert)

### 4. Other Quantitative Measures

- a. The number of courses taught exclusively for the major program for each of the last five years and the size of classes for each program level listed below:

#### **1000 level**

FY 2008 - FY 2012: 6 major program courses each year

BIOT 1011 (2 classes per year)

BIOT 1022 (2 classes per year)

BINFO 1011 (2 classes per year)

Average class size for 1000 level major program classes:

FY 2008: 10.7; FY 2009: 8.6; FY 2010: 8.7; FY 2011: 10; FY 2012: 7.9.

Overall 5 year avg: 9.2

**2000 level**

FY 2008 - FY 2012: 7 major program courses each year

1 class per year of BIOT 2823, BIOT 2843, BIOT 2921, BIOT 2352, BIOT 2933, BIOT 2942, BIOT 2933

Average class size for 2000 level major program classes

FY 2008: 7; FY 2009: 5; FY 2010: 6.1; FY 2011: 8.4; FY 2012: 10.7.

Overall 5 year avg: 7.4

- b. Student credit hours by level generated in all major courses that make up the degree program for five years.

**1000 level**

FY 2008: 84; FY 2009: 83; FY 2010: 70; FY 2011: 83; FY 2012: 65.

Overall 5 year avg: 77

**2000 level**

FY 2008: 95; FY 2009: 83; FY 2010: 101; FY 2011: 132; FY 2012: 174.

Overall 5 year avg: 117



c. Direct instructional cost for the program for the review period.

Oklahoma City Community College (OCCC) offers online courses (computer based/Internet) which allow students the freedom from attending regularly scheduled course meeting times while still earning college credit. Online courses are similar to traditional, on campus courses in that they have a regular class schedule, assignment due dates, and the expectation of student interaction. OCCC has committed resources for the creation of specialized resources for online students with the goal of increasing student success. These resources include a customized section of the OCCC website to assist them as they progress in their academic studies via distance and an orientation to the College's Learning Management System. We also provide virtual tutoring in the Math and Communication labs in addition to 24-7 tutor support through GradeResults to further customize and personalize online students' education. The cost of these initiatives and efforts totals \$55,000.00. The cost of 24-7 technology support for student and faculty support those working within the learning management system is \$65,000.00.

Technology use in the classroom continues to expand to meet the needs of our students. 150 of our classrooms are equipped with permanent multimedia equipment with the availability of mobile carts to increase the number of high tech classrooms to 100%. The cost incurred with this multiyear effort was \$1.22 Million. Faculty members are continuing to utilize student response systems, SmartBoards, slates and are implementing the use of iPads within the classroom. OCCC continues to support the utilization of technology in the classroom so faculty can continue to engage students. The use of iPads in the classroom is a new effort on campus and the cost thus far has only been \$50,000.00. The Center for Learning and Teaching offers multiple learning opportunities for faculty related to strategies for incorporating technology into instruction effectively as well as the use of the College's Learning Management System, Moodlerooms. The CLT team has strategically worked to meet the needs of our 157 full-time faculty as well as the 500 adjunct faculty members. They support them through organized workshops, online training modules, and individual faculty consultations conducted via phone, Skype, email, or in person. The consultations focus on the use of the college's LMS as well as the choosing of instructional technology to match learning objectives.

d. The number of credits and credit hours generated in the degree program that support the general education component and other major programs including certificates.

FY 2012

Gen Ed Credits: AAS 48, Cert 33, combined Gen Ed Credits: 81

e. A roster of faculty members including the number of full-time equivalent faculty in the specialized courses within the curriculum.

Fabiola Janiak-Spens, PhD

John McMurray, PhD

Ronald Scribner, MS

New FT faculty added in 2012: George Risinger, PhD, and Kim Kyker, MS

Number of full-time equivalent faculty

Program averages:

FY 2010: 1.0 FTE

FY 2011: 0.9 FTE

FY 2012: 1.1 FTE

f. If available, information about employment or advanced studies of graduates of the program over the past five years.

Over the past 5 years, 27 students completed all the requirements to obtain either an AAS (12) or a



Certificate (15) in biotechnology. Nine program graduates (33%) are currently employed full-time in field. Another 5 program graduates (19%) have been employed in the field right after completing their internship (class requirements) but are currently pursuing other interest/option or are have gone back to school. Eleven of the 27 program graduates (41%) continued to advanced/further studies immediately following the completion of the biotechnology program, with 9 pursuing a BS degree in a related field, 1 working toward an AS degree prior to transferring to a BS degree program and 1 student having obtained a PhD in physical therapy since obtaining her certificate in biotechnology (previous BS in Zoology). Two students (7%) have pursued other interests, and one student (3.7%) is currently looking for employment, preferably in the field.

- g. If available, information about the success of students from this program who have transferred to another institution.

The following information covers students who completed the biotechnology degree requirements (AAS or Certificate) during the period from 2008 through 2012. One student, who came to the program with a BS in Zoology and completed the requirements for a certificate in biotechnology, recently obtained a Ph.D. in physical therapy. Of the nine students who transferred to 4-year institutions within the state following their completion of the biotechnology program one student completed the BS in medical laboratory technology in 2010. Two other students will complete their BS degree requirements in May 2013 (one in medical laboratory technology, the other in microbiology and biochemistry - dual degrees). The remainder of the BS degree-seeking students (6) are currently still working toward their degrees.

## 5. Duplication and Demand

- a. Demand from students, taking into account the profiles of applicants, enrollment, completion data, and occupational data.

The number of students who have declared biotechnology (AAS or Certificate) as their degree has steadily increased over the past 5 years, from 37 students in 2008 to 78 students in 2012. The number of program graduates (AAS or Certificate) also increased from 2 students in 2008 to 5 students in 2012. This increase in enrollment can be attributed in large part to the higher visibility of the program through advertising and referral by faculty within the college.

We have also seen an increase in students who come to us with a BS degree in the sciences but who lack the hands-on skills and the networking to obtain a job as a laboratory assistant in the area. Some of these students are being referred to us by our connections (biotechnology industry or research laboratories) outside of the college who are familiar with our program and the success of our program graduates.

Once students have taken the first (out of a total of 7) 2000 level major class in biotechnology, the completion rate of the remaining biotechnology classes in the program is essentially 98%. Between 2006-2012, only one student, out of 37 students who took the first major biotechnology class, dropped out of the program.

Over the past 5 years, nine program graduates (33%) are currently employed full-time as laboratory technicians in the biosciences field. Another 5 program graduates (19%) have been employed in the field right after completing their internship (class requirements) but are currently pursuing other interest/option or are have gone back to school. The remainder of the program graduates continued their education or pursued other interests immediately following completion of their degrees.

- b. Demand for students produced by the program, taking into account employer demands, demands for skills of graduates, and job placement data.

The biotechnology industry in the greater Oklahoma City area has been growing recently, adding jobs at every level of their company structure. In addition, the director of the program has received several calls over the past year from researchers new to the area, who are establishing research laboratories and who are seeking to employ skilled technicians. These individuals have been referred to our program by members of the area scientific community familiar with our program graduates.

When looking at the data from the past 5 years (2008-2012), all (14) but one biotechnology program students who sought employment following their completion of the program have been able to find employment in the field in the Oklahoma City area, many of these students found employment with their internship company. Furthermore, based on requests from local biotechnology companies or researchers for skilled and responsible technicians, several students were placed with local biotechnology companies or researchers while taking program classes. These "concurrent" placements were facilitated by the program faculty and were based on the observed skills, laboratory and soft-skills, the students had demonstrated during their program classes.

- c. Demand for services or intellectual property of the program, including demands in the form of grants, contracts, or consulting.

Over the past three years, the biotechnology program faculty, Dr. Fabiola Janiak-Spens and Dr. George Risinger, under a contract with the University of Oklahoma Health Sciences Center's Graduate Program in Biomedical Sciences (GPiBS) have been teaching a one-week laboratory techniques course at OCCC's biotechnology laboratory to new graduate students of the GPiBS program.

A similar techniques course is taught annually by Dr. Fabiola Janiak-Spens to community college students who have been awarded a summer research internship through the Oklahoma IDeA Network of Biomedical Research Experience (OK-INBRE). The students learn laboratory techniques in a one-week workshop here at OCCC's biotechnology laboratory prior to their eight-week research experience at various research laboratories in the state of Oklahoma.

- d. Indirect demands in the form of faculty and student contributions to the cultural life and well-being of the community.

NA

- e. The process of program review should address meeting demands through alternative forms of delivery.

Traditional in-class teaching of skills is required due to the unique nature of hands-on laboratory skills training that is sought after by the biotechnology industry employers.

## 6. Effective Use of Resources

The resources used for a program determine, in part, the quality of the educational experiences offered and program outcomes. Resources include financial support (state funds, grants and contracts, private funds, student financial aid); library collections; facilities including laboratory and computer equipment; support services; appropriate use of technology in the instructional design and delivery processes; and the human resources of faculty and staff. The efficiency of resources may be measured by cost per student credit hour; faculty/student ratio; and other measures as appropriate. The effective use of resources should be a major concern in evaluating programs. The resources allocated to the program should reflect the program's priority consistent with the institution's mission statement and academic plan.

Over the past 6 years, the director of the biotechnology program, Dr. Fabiola Janiak-Spens, has been awarded grants from OCAST (Oklahoma Center for the Advancement of Science and Technology) for "Faculty and Student Research and Development Internships Program" which pays stipends to biotechnology program student interns for the duration of their 8-week internship at a biotechnology partner company. Many of our program students have to work while going to school, and these grants/stipends allow the biotechnology student interns to focus on their internship while they are at a potential place of employment.

The dedicated biotechnology laboratory space at OCCC provides the program students with access to technology as it is found at places of employment in local companies. The students in 2000 level have access to the laboratory outside of scheduled class time, so they can make-up missed work, re-do experiments, or practice skills that need improvement. Students also have access to several computer stations for online research of techniques, background information, and protocols.

To keep abreast with the technology and research trends applied in area biotechnology companies and laboratories, the biotechnology program director obtains feedback from the local companies directly, previous program graduates who work in the industry, as well as from the members of the biotechnology program advisory board.

To maintain a high level of skills development and training, the 2000 level biotechnology laboratory classes are kept at a low student to instructor ratio (10-12:1). This allows proper teaching and supervision of not only the hands-on skills but also of student's soft skills, like communication - oral and written, that are valued by potential employers.

#### IV. Program Review Recommendations

This section is a description of recommendations that have been made as a result of the review and of actions that are planned to implement these recommendations. Recommendations should be clearly linked and supported by the information and analyses that were articulated in the previous sections and should contain a realistic strategy for implementation of any changes.

##### A. Describe the strengths of the program identified through this review.

1. Our students do obtain employment in bioscience fields after program completion.
2. Our administration is very supportive of the program, giving adequate funding for annual supplies and personnel.
3. Our faculty is well qualified and active in professional development. New faculty has been added to provide additional training and potential research opportunities for students.
4. The program director participates in biotechnology education at the national level through the Bio-Link network to keep abreast of trends and opportunities in biotechnology.
5. The biotechnology program has been providing biotechnology outreach to area high school students and teachers. The college is expected to benefit from this project by increased numbers of students into our biotechnology program as well as other science programs.

##### B. Describe the concerns regarding the program that have been identified through this review.

1. The number of students in the program is still relatively small, but has increased in the last two years. The outreach program to area high school students and teachers has not resulted in a visible increase in enrollment to the biotechnology program specifically. However, the articulation agreement with Moore Norman Technology Center (MNTC) biotechnology program has resulted in two students from the MNTC program enrolling at OCCC and pursuing a AAS or Certificate in Biotechnology.
2. The program will need additional expensive equipment in the future as the field of biotechnology changes and as existing equipment ages. For example, two large pieces of equipment that are central to the 2000 level biotechnology class 'Cell Tissue Culture' had to be replaced in 2012 at a combined cost of \$13,500. The old existing pieces were no longer repairable or usable for laboratory training. Several students have found employment after obtaining their degrees specifically because of laboratory skills acquired using these pieces of equipment. Another piece of equipment, a \$28,000 bioreactor, was acquired in 2009 to provide students with skills training for the biomanufacturing sector. Cyto Vance Biologics has consistently hired our biotechnology program students based on the biomanufacturing training. Any future equipment purchase and student training recommendations made by the Biotechnology Program Advisory Board members who are leaders in the Oklahoma City biotechnology industry will have to be evaluated and considered for incorporation into skills training of students to ensure students preparedness for employment.
3. Curriculum assessment and development need to be ongoing to ensure that program student skills are in line with local biotechnology industry needs. This requires continued communication with local industry and research employers as well as faculty training and

development.

C. Develop a list of recommendations for action that addresses each of the identified concerns and identify planned actions to implement recommendations.

1. Continue recruitment efforts for the program within the college through instructors in related classes, advising, and maintain advertising/marketing (online) so that individuals not currently associated with OCCC can easily find the program. Continue advertising/interacting with existing and potential area employers to provide employment opportunities for biotechnology program graduates.
2. Maintain existing equipment to ensure consistent performance and long use. Continue to seek sources in and outside the college for new equipment as needs arise.
3. Continue faculty development support of all program faculty to ensure up-to-date training/knowledge in biotechnology techniques used in area and nationwide biotechnology industry.
4. Continue meeting with current and potential employers and biotechnology industry organization in Oklahoma (OKBio) to assess current and future industry needs with regard to employment and technology.

D. Provide institutional recommendations as the result of the program review and planned actions to implement recommendations.

The Biotechnology program at OCCC continues to play a vital role in an important, and targeted, industry in central Oklahoma. This program is the best source of trained technicians for research laboratories and commercial biotech and bio-manufacturing companies in the area. If this industry is to continue to grow and thrive, the program at OCCC must remain healthy in the years to come.

OCCC recognizes this reality and is committed to continuing support for the program. Specifically, the program's ongoing needs will be funded at historical levels or greater; and increased emphasis will be placed on student recruitment and professional development. As the program finishes its 15th year this may be a good time to survey our stakeholders in an effort to anticipate major equipment needs in the future. Given adequate warning the division of science and mathematics as well as the institution as a whole stands ready to invest resources to make sure that the facilities reflect industry standards.



## General Education Courses

[illegible]

Support Courses		
Prefix & Number	Course Title	Credit Hours
CHEM 1215	General Chemistry II	5
CHEM 2114	Organic Chemistry I	4
MATH 1513	College Algebra	3

Life Skills Courses		
Prefix & Number	Course Title	Credit Hours
SCL 1001	Success in College and Life	1