

**PROGRAM APPROVAL APPLICATION**  
**NEW or SUBSTANTIAL CHANGE or LOCALLY APPROVED**  
**(This application may not exceed 3 pages)**

**Fill In Form**

Biotechnology Level II: Biomanufacturing Technician  
Certificate of Achievement

Fall 2016

Proposed Program Title

Projected Program Start Date

Fullerton College

North Orange County Community College District

College

District

**Contact Information**

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Voting Member

Title

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Phone Number

Email

**Goal(s) of Program (Check all that apply):**

Career Technical Education (CTE)

Transfer

Other

**Type of Program (Check all that apply):**

Certificate of Achievement 12-17 (or 17-27 quarter) units

Certificate of Achievement 18+ semester (or 27+ quarter) units

Associate of Science Degree

Associate of Arts Degree

**Reason for Approval Request (Check One):**

New Program

Substantial Change

Locally Approved

**Program Information**

0430.00

Recommended [Taxonomy of Program \(TOP\) Code](#)

Units for Major-Degree

Total Units for Degree

19-24

Required Units-Certificate

**1. Insert the description of the program as it will appear in the catalog. (See PCAH pp. 142 and 170)**

The Biotechnology Level II: Biomanufacturing Technician Certificate is the second certificate of the Biotechnology series. This certificate focuses on practical laboratory skills of protein biochemistry combined with training in quality assurance and quality control. The curriculum prepares a student to work in entry level positions in the field of biotechnology in high-tech industry and institutions. Employment opportunities include: biomedical industry, academic research labs, pharmaceutical, agriculture and food science labs. This Biotechnology Level II certificate requires the completion of the Biotechnology Level I Certificate (8-13 units), plus 11 units in required courses, for a total of 19-24 units. A grade of C or better is required in each course taken.

**2. Provide a brief rationale for the program.**

Fullerton College and our collaborators met with a biotechnology advisory committee in June 2012 which recommended developing a stackable certificate that would provide new students and incumbent workers with skills to enter and advance in this growing industry. Since that meeting, all four community colleges have worked together to research and plan for the implementation of such a certificate. The certificate will be comprised of courses intended to develop and ensure proficiency in specific lab-based skills as well as more traditional basic biology and chemistry courses. We have proceeded in developing this program with the support of colleagues at Santiago Canyon College, Santa Ana College, Irvine Valley College and Wendie Johnston, director of the Pasadena City College LA/OC Biotechnology Economic Workforce Development Program.

The major goal of the stackable Biotechnology certificate series is to provide students with information and skills which will provide employment and advancement opportunities in the biotechnology sector, which includes many industries from food processing to research and development to medical device manufacturing. There are three tiers to the stackable certificates. The first level provides an overview of the industry, basic laboratory skills and related theory. The second level focuses on protein-related work (including Biomanufacturing) and quality control. The third level provides training in the booming field of nucleic acids, but also allow the student flexibility in choosing courses that align best with their interests and opportunities in the industry.

**3. Summarize the Labor Market Information (LMI) and employment outlook (including citation for the source of the data) for students exiting the program. (See PCAH pp. 85-88, 136, 147, 148, 165, 168, and 176)**

The April 2016 report “Middle-Skill Biotechnology Occupations in Los Angeles and Orange Counties”, prepared by the LA/OC Center of Excellence for Labor Market Research, states that nearly 9000 job postings in the region are associated with middle-skill biotechnology occupations. In 2015, there were 484 openings for **manufacturing production technicians**, with 75 openings expected by 2020. Manufacturing production technicians lead all middle-skill, biotech-related occupations with the highest median hourly wage, \$30.39, and can expect to earn around \$38 as an experienced worker. <sup>(B)</sup>

In 2015, there were 3339 postings for the occupation of **inspectors, testers, sorters, samplers, and weighters**. Nearly 40% of the LA/OC biotechnology job listings listed quality assurance and control as a required fundamental skill. The new Bio 194 course (Quality and Regulatory Compliance in the Biosciences) gives better preparation for the community college students.

The conclusion of the April 2016 report is that “there appears to be a looming shortage of middle-skill workers to enter the biotechnology workforce”. <sup>(B)</sup>

Currently, the Los Angeles/Orange region has 41% of the biotechnology industry with the most employees in over 80,800 jobs. <sup>(A)</sup> This region also has the highest sales revenue at \$23.6 billion. The Los Angeles and Orange County region is projected to offer 10,000-15,000 biotechnology jobs between 2012-2022. <sup>(A)</sup>

**Sources:**

- A. Supply and Demand Analysis: Life Sciences and Biotech Middle Skills Workforce in California, (October 2014), [http://www.calbiotechcareers.org/wp-content/uploads/2014/11/LS-Biotech-Middle-Skills-Jobs-in-CA\\_Report\\_Oct-2014.pdf](http://www.calbiotechcareers.org/wp-content/uploads/2014/11/LS-Biotech-Middle-Skills-Jobs-in-CA_Report_Oct-2014.pdf), accessed on May 1, 2016.
- B. Middle-skill Biotechnology Occupations in Los Angeles and Orange Counties (April 2016).

**4. List similar programs at other colleges in the Los Angeles and Orange County Region which may be adversely impacted. (There is space for 10 listings, if you need more, please contact [laocrc@sccollege.edu](mailto:laocrc@sccollege.edu))**

College	Program	Who You Contacted	Outcome
Santiago Canyon College	Biotechnology A.S. and Certificate	Denise Foley, Ph.D.	Supports
Santa Ana College	Biotechnology Technician Certificate	Kathleen Takahashi, Ph.D.	Supports
Irvine Valley College	Biotechnology Certificate	Emalee Mackenzie	Supports
Pasadena City College	Biological Technology, Lab Assistant Certificates	Pamela Eversole-Cire, Ph.D.	Supports
Citrus College	Biotechnology A.S., Biomanufacturing Certificate	Barbara Juncosa, Ph.D.	Supports

**5. List all courses required for program completion, including core requirements, restricted electives and prerequisites. (There is space for 20 listings, if you need more, please contact [laocrc@sccollege.edu](mailto:laocrc@sccollege.edu)). (See PCAH pp. 143 and 171)**

Courses	Course Number	Course Title	Units
Required Course	BIOL 190	Introduction to Biotechnology	3
Required Course	BIOL 190L	Introduction to Biotechnology Lab	1
Required Course	BIOL 191	Biotechnology A: Basic Laboratory Skills	4
Required Course	BIOL 192	Biotechnology B: Protein	4
Required Course	BIOL 194	Quality and Regulatory Compliance in the Biosciences	2
Required Course	CHEM 101 OR CHEM 107 OR Assessment	Chemistry for Allied Health Science OR Preparation for General Chemistry OR Chemistry Assessment (minimum 80%)	0/5/5
Required Course	CHEM 201 OR CHEM 111A	Biochemistry for Allied Health Science OR General Chemistry I	5

**6. Include any other information you would like to share.**