



# Solano Community College District

## Substantive Change Proposal Baccalaureate Program in Biomanufacturing

Submitted by:

Solano College  
4000 Suisun Valley Road  
Fairfield, CA 94534

Submitted to:

Accrediting Commission for Community and Junior Colleges,  
Western Association of Schools and Colleges  
September 9, 2016

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Substantive Change Proposal Certification Page

To: Accrediting Commission for Community and Junior Colleges,  
Western Association of Schools and Colleges


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I certify there was broad participation by the campus community and believe this report accurately reflects the nature and substance of this institution.

Signatures:

 Date: 9-7-16

Celia Esposito-Noy, Ed.D.  
Superintendent/President

 Date: 9-07-16

Michael A. Martin  
President, Board of Trustees

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## Introduction

The Solano Community College District (SCCD), a single-college district consisting of Solano College, was established in 1945 as Vallejo Junior College. At that time, the College was part of the Vallejo Unified School District. In 1967, the College became a countywide institution. The 192-acre main campus, located in the center of Solano County, lies just off Interstate 80. Construction was completed on this campus in 1971 and it opened in 1972 with 5,000 students. Since then, facilities, programs, staff, and services have grown to meet the expanding and changing needs of the county and regional population.

Solano College is part of California's public community college system of 113 colleges in 72 districts across the state. The College's service area encompasses the Solano County communities of Benicia, Dixon, Fairfield, Suisun, Vacaville, Vallejo, Travis Air Force Base, and the Yolo County community of Winters. Many graduates of the area's 16 public and three private high schools take advantage of the educational opportunities offered by Solano College. Solano College's classes are held during two semesters each year (Fall and Spring semesters) and summer sessions. Flexible scheduling, designed for students' convenience, includes day, evening, and Saturday classes, held on and off the campus, using distance education (online), and travel study. Some courses are taught in short-term or open-entry/open-exit formats.

With a student population nearing 10,000 students in recent semesters, generating approximately 27,000 duplicated headcounts (students enrolling in multiple courses), Solano College offers academic study and career technical education (CTE) to all students. The addition of the baccalaureate program in Biomanufacturing will expand and enhance current program offerings and offer additional opportunities for interested students, especially those in the San Francisco Bay Area and the surrounding regions.

The College has offered a Biotechnology program since 1997. Graduates are often employed in biotech companies within the San Francisco Bay Area and in other parts of the country. This current program designed and pioneered the teaching of the knowledge and skills required for graduates to succeed in the manufacturing sector of the biotech industry. The proposed Bachelor's degree in Biomanufacturing program represents a logical extension of the existing program.

The existing two-year program supports economic development and workforce efforts throughout the San Francisco Bay area, but emphasizes supporting the considerable number of biotechnology companies in the near vicinity. The City of Vacaville is home to Genentech Vacaville. This plant is the largest multi-use cell culture manufacturing facility in the world. The company plans to double its manufacturing capacity when the Cell Culture Production facility receives its expected approval from the Food and Drug Administration next year. Vacaville is also home to the Janssen Pharmaceuticals manufacturing plant, a subsidiary of Johnson and Johnson, and a manufacturing plant recently acquired by Eli Lilly (formerly owned by Novartis, Inc.). Solano College routinely places graduates into these facilities, and has an excellent placement rate with Bayer (in Berkeley, California) and BioMarin (in Novato, California). The courses in the Bachelor's degree will provide upper division general education and higher level technical skills to graduates to help them achieve greater upward mobility within these companies and in related industries.

A. A concise description of the change and request to add a baccalaureate program

The Solano Community College District is proposing to offer a Bachelor’s Degree in Biomanufacturing and is submitting this substantive change proposal to the Accrediting Commission for Community and Junior Colleges (ACCJC) at this time. The new degree will accomplish the dual goals of meeting a regional need and enhancing the college mission. This change will authorize a baccalaureate program that builds upon the existing Industrial Biotechnology Associate Degree, and requires the completion of either the Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education (CSU-GE) lower division pattern. The program adds ten (10) upper division classes in the major, and adds three (3) upper division General Education classes from disciplines outside of the major. This substantive change proposal has been prepared in accordance with the ACCJC’s published guidelines and Substantive Change Manual.

In the fall of 2014, Senate Bill 850 (Block) authorized the California Community College Chancellor’s Office to select 15 colleges to pilot a Bachelor’s degree for the first time in California history. The legislation specified that the subject of the Bachelor’s degree would not overlap with existing programs in the California State University (CSU) or the University of California (UC) systems, and would offer programs to meet unmet workforce need. Additionally, legislation specified that colleges in the pilot program must have the resources, expertise, and student interest to offer a successful program ([Appendix A](#)).

Discussions among Solano College faculty and staff about the feasibility of creating a Bachelor’s degree program began soon after SB 850 was passed. Initial discussions with the Board of Trustees in the College’s planning of the program began in November 2014 ([Appendix B](#)).

In December 2014, Solano College applied to become one of the first fifteen colleges to offer a Bachelor’s degree. In that first round, as announced in January 2015, Solano College was not selected by the Chancellor’s Office to participate. Later, three of the first fifteen colleges selected withdrew from consideration and the Chancellor’s Office reopened the application. Solano College reapplied along with thirteen other colleges for the open spots. In May 2015, Solano College’s proposal was approved by the California Community College Board of Governors. Solano College then immediately began planning to offer a Bachelor’s degree.

***Timeline of Events***

SB 850 – Signed by Governor Brown	September 28, 2014
First application	December 19, 2014
Second application	April 16, 2015
Supplemental application	May 5, 2015
Approved by California Board of Governors	May 18, 2015
Substantive change proposal submitted	September 9, 2016
Substantive change approved by Commission	October 2016 (anticipated)
Upper division classes begin	August 2017
First graduating class completes the degree	May 2019



Solano College formed several committees to plan for this Bachelor's degree. These committees have been meeting regularly to plan to the program, and this substantive change proposal has been prepared and its related evidence compiled through the work of these committees and its members.

Planning committees include the Biomanufacturing Bachelor's Degree Implementation Advisory Committee, and following subgroups in addition to the advisory committee:

- Curriculum Development and Approval Subcommittee
- Accreditation Substantive Change Subcommittee
- Admissions, Counseling, and Student Services Subcommittee

In addition, the committees have worked closely with Academic Senate, with the Curriculum Committee as a subcommittee of Academic Senate, with the College Governance Council (formerly the Shared Governance Council), and with the Management Team (Deans, Vice Presidents, and the Superintendent/President).

Therefore, Solano College submits this substantive change proposal to request that the Accrediting Commission for Community and Junior Colleges (ACCJC) approve this substantive change proposal to offer a Bachelor of Science in Biomanufacturing as part of the College's degree offerings.

## 1. Evidence that the field of study for the degree is consistent with the institutional mission

The Solano Community College Mission statement has clearly described the institution's educational purposes and programs, its intended student population, and its commitment to student learning and achievement. The Mission statement historically has provided the foundation for Solano's academic and student support programs and for all of its institutional goals.

### Mission Statement (for the years 2012 – 2016)

Solano Community College's mission is to educate a culturally and academically diverse student population drawn from our local communities and beyond. We are committed to helping our students achieve their educational, professional, and personal goals centered in basic skills, education, workforce development and training, and transfer-level education. The College accomplishes this three-fold mission through its dedicated teaching, innovative programs, broad curricula, and services that are responsive to the complex needs of all students.

Solano College periodically evaluates its mission statement and revises it as necessary. The Solano Community College District Board of Trustees approved the mission statement above on December 19, 2012, as reviewed in part for the ongoing accreditation process, and with approvals in place from the Shared Governance Council ([Appendix C](#)).

## **Mission Review and Modification**

California Senate Bill 850 requires that community colleges offering bachelor's degrees "shall have the additional mission to provide high quality undergraduate education at an affordable price for students and the state." Therefore, a wording revision to the college mission replaces the words "transfer level education" with "undergraduate education." The revised mission statement reads:

Solano Community College's mission is to educate a culturally and academically diverse student population drawn from our local communities and beyond. We are committed to student learning and achievement and to helping our students achieve their educational, professional, and personal goals. Solano transforms students' lives with undergraduate education, transfer courses, career-and-technical education, certificate programs, workforce development and training, basic-skills education, and lifelong-learning opportunities.

The Academic Senate reviewed and approved changes to the Mission Statement at their regular meeting on January 25, 2016 (see [Appendix C.1](#) for the approved Academic Senate minutes). The College Governance Council, including the Associated Students along with administrative and staff representatives, discussed and approved changes to the college mission at their January 25, 2016 meeting ([Appendix C.2.](#)). The Board of Trustees approve changes as above at their June 15, 2016 meeting ([Appendix C.3.](#)) after review by their Board Subcommittee on Policies and Procedures. Discussion among members of faculty, staff, students, and administrators has been positive toward changes to the Mission Statement to include reference to undergraduate education. As part of its regular planning cycle, Solano College will review the mission statement regularly and will confirm or revise the current language in reference to all wording, include that on undergraduate education.

## **Degree Alignment to the Mission**

The proposed baccalaureate in Biomanufacturing is aligned with Solano College's mission as an institution that provides both academic and career technical education. The field of Biomanufacturing draws upon many academic disciplines including molecular and cellular biology, but it also requires technical knowledge gained from the fields of engineering and business. This program builds upon Solano College's existing Industrial Biotechnology program, which currently offers two certificates and one associate degree. The new degree will allow students who complete the local associate degree or equivalent course work from other colleges to earn a baccalaureate, which will better prepare them for positions in the biotechnology industry. A baccalaureate degree allows a greater versatility in application for positions and for enhanced upward mobility once hired. The Bachelor's degree in Biomanufacturing supports regional workforce and economic development efforts. Validating this statement, the College received a letter from the Solano Economic Development Corporation in support of its application for the state pilot. The biotechnology industry in the San Francisco Bay area remains strong, is experiencing an increase in workforce demand, and will generate career placement opportunities for these graduates (employment potential is addressed later in this document). Solano College's proposed degree will allow local and regional students to enter this field with greater expertise and career preparation, as evidenced by labor market studies referenced in this document.

Further evidence of the baccalaureate's alignment to the College mission is its relationship to Solano College's institutional goals. The Solano Community College District's Educational Master Plan (EMP) was revised in July 2014, and in that document, the Educational Master Plan goals were aligned with the District Strategic Plan goals ([EMP Link](#)). The EMP serves as the key planning document for the college. To prepare these documents, the College engaged in cross-constituency dialog and utilized extensive research carried out by college staff and consultants. Excerpts from the College's webpage confirm this dialog and highlight the alignment of Solano's strategic plan, objectives and educational program goals with its stated mission and the projected offering of the baccalaureate degree in Biomanufacturing.

***From the SCCD Webpage:***

*“The Solano College Strategic Plan is a collection of projects that will be completed in the next 3 years organized by SCC’s Strategic Goals and Objectives. Strategic Goals and Objectives are a breakdown of the Mission, Vision, and Values. While the Mission, Vision, and Values are almost intangible, broad statements, the strategic goals and objectives attempt to add a little substance and demonstrable action to those statements. This intermediate makes it much easier for individual departments to view the work they are completing as part of a wider mission of the District.”*

***District Strategic Goals and Objectives***

*Goal 1, Foster Excellence in Learning*

*Obj. 1.1, Create an environment that is conducive to student learning.*

*Obj. 1.2, Create an environment that supports quality teaching.*

*Obj. 1.3, Optimize student performance on Institutional Core Competencies.*

*Goal 2, Maximize Student Access & Success*

*Obj. 2.1, Identify and provide appropriate support for underprepared students.*

*Obj. 2.2, Update and strengthen career/technical curricula.*

*Obj. 2.3, Identify and provide appropriate support for transfer students.*

*Obj. 2.4, Improve student access to college facilities and services for students.*

*Obj. 2.5, Develop and implement an effective Enrollment Management Plan.*

*Goal 3, Strengthen Community Connections*

*Obj. 3.1, Respond to community needs.*

*Obj. 3.2, Expand ties to the community.*

*Goal 4, Optimize Resources*

*Obj. 4.1, Develop and manage resources to support institutional effectiveness.*

*Obj. 4.2, Maximize organizational efficiency and effectiveness.*

*Obj. 4.3, Maintain up-to-date technology to support the curriculum and business functions.*

***Educational Master Plan Goals***

*The following Educational Master Plan goals establish an overarching structure for SCCD:*

***Educational program development***

*Goal A: Develop workforce-ready career and technical graduates.*

*Goal B: Improve basic skills of all students.*

*Goal C: Align program offerings for transfer achievement.*

*Goal D: Reduce achievement gaps in all programs.*

*Goal E: Strengthen program development through research and assessment.*

*Goal F: Improve student access to courses, programs, and services that contribute to student success.*

*Goal G: Strengthen community partnerships.*

*Goal H: Connect students to the college community.*

*Goal I: Build alternative funding and revenue sources.*

Expanding the existing Industrial Biotechnology program with the proposed Bachelor's degree in Biomanufacturing furthers the both the College's and the program's ability to support many of these goals and objectives, especially those related to developing workforce-ready graduates, engaging as a community partner, and supporting quality teaching and student learning. This program will provide courses designed to be perfectly aligned with community college lower division offerings. The design of this program has been specifically tailored to develop workforce-ready graduates with the breadth and depth of upper division general education and required technical expertise. The program enhances the community by generating a trained workforce that supports one of the most important industries locally, regionally, and nationally. The educated workforce serves as a tool used by economic development agencies to attract and retain biotechnology companies.

The Educational Master Plan included the following analysis specifically targeting Biotechnology, the existing lower-division program:

Program Name: **Biotechnology**

Strategies:

- Expand the capacity of the biotechnology course offerings to meet the explosive growth of the biotechnology industry and related life science fields and the dramatically increased demand for biotechnology technicians.
- Expand course offerings to meet emerging industry trends and needs (training for stem cell manufacturing, biofuel and biomaterial production, synthetic life, etc.).
- Examine the demand for workers and the potential for developing course offerings in imaging (electron microscopy, atomic force microscopy).
- Diversify and assess effectiveness of course delivery modes (online courses, short-term specialty courses, accelerated courses or accelerated program).
- Introduce a Contract Research Organization into the program, which would generate in-house internships and add an entrepreneurship training component to the biotech program.
- Add a basic skills introductory and/or contextualized learning component to the program (modeled on the highly successful Bridge to Biotechnology program).
- Expand workforce training partnerships with local high schools.
- Increase recruitment strategies for discharged veterans.
- Recruit underrepresented groups using a program like CCSF's Bridge to Biotechnology.
- Outreach to students from fields with comparable prerequisite requirements like nursing or water/wastewater.
- Develop new instructional tools like computer simulations.
- Increase the web presence of the program.

- Explore founding a company incubator that could use biotechnology program equipment and facilities, generate some revenue, and use students as interns

### **Rationale:**

This program increases student access and improves workforce preparedness. Recent dramatic growth in enrollment in this field, low competition from other educational providers, and current industry expansion in the county and greater Bay Area and Sacramento regions indicate the need for program expansion to meet workforce and economic development needs. Increased student access to emerging areas such as synthetic biology, biofuels, stem cell science, and imaging (used in nanotechnology) would lead to career possibilities for program graduates. Strengthened existing programs provide more options for the students and meet industry demand. Providing a short-term program component to "fast track" students who have a degree could increase interest in the program and respond to the need for trained workers. To meet this need the department designed and delivered the Industrial Biotechnology Intensive Summer boot camp (Summer 2013) funded by a U. S. Department of Labor grant. The delivery of similar short courses could be designed to meet the particular needs of job seekers. The strategy of providing in-house internships and entrepreneurial training using a Contract Research Organization has been used successfully in other parts of the country and would increase the workforce readiness of our students. The introduction of a Bridge to Biotech (basic skills) program would expand the outreach of the program to economically disadvantaged populations within our county.

Again, the addition of a Bachelor's degree is aligned with the College's mission and strategic plans and fulfills many of these goals, especially those that call for expansion and broadening of the expertise of graduates.

These goals are also supported by the new facilities being built by Solano College in Vacaville as part of the Facilities Master Plan (FMP). The Facilities Master Plan ([FMP Link](#)) was revised in June 2013 and adopted by the Board of Trustees. This plan's growth goals are supported by the \$348 million Measure Q bond approved by Solano County voters in 2012. The first building scheduled for completion is the Biotechnology/Science building on the Vacaville campus. This building (with several million dollars of new biotechnology equipment) is projected to be completed in time for the Fall 2017 semester, which coincides with the first offerings of the proposed upper division course curricula in Biomanufacturing.

*Note: It is important to note to the Commission that Solano College does plan to submit a substantive change proposal to locate the majority of a program at the Vacaville site, once construction is underway on the new building and usage plans are solidified.*

## **2. Rationale for change**

The San Francisco Bay Area serves as "the birthplace of biotechnology." The fundamental scientific discoveries underlying the industry were made in this region, and the business model that became the biotechnology industry first emerged here (driven by the same entrepreneurs who founded Silicon Valley). The region is dominant in this field both nationally and internationally, and it is expected to experience significant growth in the next decade and beyond. For the communities that house biotechnology companies, these companies provide their residents with

high demand, high growth, high upward mobility, and high wage careers. The key driver of this growth will be a trained workforce, and Solano College and the other Bay Area community colleges offering biotechnology programs play a key role in providing this workforce.

Therefore, Solano College decided through its planning processes that it was logical to design a baccalaureate degree that is tailored specifically for the needs of the industry. Solano College is a logical choice to be the lead college to accomplish this because:

1. Solano College was one of the first colleges in the United States, two-year or four-year, whose biotechnology degree emphasized biomanufacturing, and the program has been in existence for almost two decades.
2. Solano College faculty members have the required expertise in this field.
3. Solano College is building a \$34.5 million biotechnology training center on its Vacaville campus, and the opening of this building in Fall 2017 will coincide with the launch of the proposed upper division courses.
4. The purchase of several million dollars of state-of-the-art equipment accompanies the opening of this building.
5. Solano College is located in one of the biggest hubs of biomanufacturing in the world; for example, the Genentech Biomanufacturing plant across the street from Solano College's Vacaville campus is the largest cell culture manufacturing facility in the world.

Solano College has relationships with all of the public high schools and most of the private high schools within Solano County, and within many in the neighboring counties. Many of these high schools have biotechnology classes that are articulated with the program, and a clear pathway has been designed for students interested in preparing for a future Biotechnology and Biomanufacturing education.

Transitions from high school to college are becoming more seamless with the recent passage of AB 288, the College and Career Access Pathways Act (Holden, 2015). This new legislation simplifies the articulation of high school and community college courses. Currently, the College is exploring the possibility of offering dual enrollment courses, as legislated in AB 288. These articulations make for a seamless matriculation between the high schools and the college. Historically, the weakness that prevented a true career pathway was the transition between the community colleges and the four-year degree. The College's proposal for the baccalaureate degree addresses this historical problem by designing a transition between lower division and upper division where students gain higher skills and lose no units.

Solano College has based its design of this Bachelor's degree program on the following propositions:

1. The Bachelor's degree will build upon Solano College's successful Associate Degree in Industrial Biotechnology. This program has served as a model for biomanufacturing courses around the United States.
2. Solano College faculty members have worked closely with our partner college MiraCosta College (Oceanside, CA) to try to coordinate the programs, and have worked with MiraCosta College in sharing expertise for over a decade. We believe that this uniformity will aid with industry acceptance of the Bachelor's degrees.

3. Solano College has used its own Industry Advisory Board and that of MiraCosta College to design the curriculum.
4. Solano College has been communicating extensively with the other colleges in California to help them align their programs with ours so that their students can transfer seamlessly into the program.
5. Solano College is aligning the feeder courses for the Bachelor's degree with the California State curriculum identification system (C-IDs). This will enable an easy transfer by students from other colleges and it will align the lower division offering with a statewide standard.
6. Solano College has designed the Bachelor's degree accepting all of the recommendations adopted by the Statewide California Community Colleges Academic Senate at their plenary session in November 2015.
7. Solano College has aligned upper division offerings with the definition of upper division determined by the Statewide Academic Senate.
8. The program has been aligned with certifications from professional organization certifications whenever possible; thus providing an external validation.
9. The legislation authorizing this Bachelor's degree specified that it should not be a terminal degree; therefore, we have entered into conversations with California State Universities offering post-Baccalaureate or Master's degrees in biotechnology and other institutions in an effort to provide a smooth transition to those programs.
10. Solano College will hire a new faculty member to help implement and run the program.

While the legislation that authorized the baccalaureate degree specified that no community college degrees would overlap with degrees already being offered in the California State University or the University of California systems, some universities, including neighboring UC Davis, offered "biotechnology" degrees that taught the knowledge needed to enter into biotechnology research. No universities, however, taught Biomanufacturing, the skills and knowledge required for students to enter into the manufacturing sector of the biotechnology industry. Therefore, with the approval of the Bachelor's degree program, both Solano College and MiraCosta College will be able to add another option to the postsecondary degree choices of students in the region and in the state. Locating Biomanufacturing program sites in both Northern California and Southern California also adds options for students who wish to enter this career field.

The proposed Biomanufacturing baccalaureate is not designed as a terminal degree. The faculty members of Solano College designing the biomanufacturing baccalaureate have begun conversations with Master's degree granting institutions in an attempt to design a seamless transition for students. We have entered in discussions with Touro University in Vallejo, California. We will enter into discussions with several campuses of the California State University system, specifically San Francisco State, CSU Channel Islands, and the Keck Graduate Institute (one of the Claremont Colleges) in upcoming months. Additionally, a Master's degree in Business Administration would also serve as a logical next degree, and we will continue to develop this possible avenue as well.

The alignment of the baccalaureate program in Biomanufacturing with Solano College's mission is strong and evident, and the rationale for pursuing this additional undergraduate offering is clear, provides an attractive academic pathway for its students and a qualified workforce for the region's industries (Figure 1).

It is notable to clarify the working relationship between Solano College (Northern California) and MiraCosta College (Southern California), stated in the propositions listed above, regarding respective proposals for the Bachelor of Science in Biomanufacturing. While Solano faculty members have worked collegially with MiraCosta College, we emphasize that there is no formal or legal relationship between the two colleges or the two programs. Instead, the relationship is an extension of preexisting collegial relationships which have existed for over two decades in the fields of biotechnology and biomanufacturing, and involves academic collaboration about pedagogy, curriculum, equipment, assessment, and other non-curriculum matters, such as application processes and approaches to the provision of student services.

Discipline faculty at both institutions have collaborated in the development of core upper division curriculum for both programs. This allows both institution to benefit from the additional professional expertise in the design of courses unique to the field of biomanufacturing. As well, the development of core curriculum in cooperation with MiraCosta provides more consistent recognition of the new programs with our industry partners, including additional confidence in the hiring of graduates. It also offers students in California more geographic flexibility. This collaboration will continue as the details of each course are worked out: equipment, lectures, lesson plans, Standard Operating Procedures for equipment, and the like. Collegial collaboration between the two colleges is therefore a natural extension of the ground-breaking work already occurring at both colleges in the field of biomanufacturing.

The biotechnology departments of Solano College and MiraCosta College have engaged in academic collaboration in biotechnology and related fields for over two decades. While MiraCosta has the older biotechnology program, founded in 1990, the program at Solano College, founded in 1997, was one of the first programs in the United States, two- or four-year, to emphasize the knowledge and skills required to enter the manufacturing sector of the biotechnology industry, a field now identified as biomanufacturing.

In 1997, Solano College developed the existing biotechnology program in response to the announcement that the pioneering biotechnology company Genentech would build the largest multi-use cell culture manufacturing facility in the world in Solano County. This facility joined other pharmaceutical manufacturing plants run by Alza Pharmaceuticals (now a division of Johnson and Johnson) and Chiron (later acquired by Novartis). In 2000, MiraCosta College gained an interest in biomanufacturing when the antibody company IDEC announced their plans to build a major cell culture manufacturing facility within miles of their campus, thereby triggering an exploration for the college to expand its curriculum to include biomanufacturing. IDEC Director of Training Mary Schwalen and Dean Ric Matthews visited Solano College three times in 2002 to discuss curriculum and to develop an equipment list. MiraCosta adopted much of the curriculum including the Course Outlines of Record and the catalog descriptions. The similarities between the programs proved useful when Genentech purchased the IDEC facility: Genentech's familiarity with the Solano College program translated into an instant recognition of the MiraCosta program. Solano College's faculty introduced the staff of Genentech's College Program team to the MiraCosta faculty. The two colleges learned the advantage of coordination and alignment.

This approach is a subset of a several national collaboration efforts between community college biotechnology faculty. The oldest collaboration is called Bio-Link ([www.bio-link.org](http://www.bio-link.org) or [www.biotech.org](http://www.biotech.org)). This National Science Foundation (NSF) Advanced Technological



Education grant-funded center has brought biotech faculty together from every corner of the United States for collaboration since 1998. Solano College served as the Bio-Link Southwest hub until a reorganization eliminated regional hubs. Through Bio-Link, faculty from MiraCosta College and Solano College helped define national skill standards and course content for biomanufacturing. Any college in the United States thinking about offering biomanufacturing would likely consult one or both of these colleges. Solano College estimates that its laboratory has been toured by faculty and administrators from 30 states and 8 countries. Bio-Link gave rise to another consortium, also NSF funded, called the Northeast Biomanufacturing Center and Collaborative ([www.biomanufacturing.org](http://www.biomanufacturing.org)). MiraCosta College serves as its Southwest Hub and Solano College faculty member Jim DeKloe serves as the chairman of their National Visiting Committee. MiraCosta College serves as a partner, and Solano College played a small role, in the 12-college Department of Labor funded Community College Consortium for Biotech Credentials (<http://biotechworkforce.org>). After four years of work, this effort recently finalized and published Core Skill Standards for Bioscience Technicians, and Skill Standards for Medical Devices. The Skill Standards for Biomanufacturing are being finalized and will be published in the near future. MiraCosta College and Solano College have played roles in each of these overlapping consortia. The colleges also collaborated in several grant proposals that were not funded.

Solano Community College and MiraCosta College have a deep history of collaboration in the field of biomanufacturing. Current collegial collaborations are an extension of these pre-existing relationships. A timeline of professional collaboration activities over a ten-year period is included in this proposal ([Appendix C.4](#)).

## **B. A Description of the New Program to be offered; level and rigor of upper division courses commonly accepted as appropriate to the baccalaureate degree; program length; identification of delivery mode for the courses**

### **Program Description**

The proposed baccalaureate program in Biomanufacturing will prepare students for employment in the manufacturing sector of the biotechnology industry. Currently biomanufacturing means growing living cells (bacterial, yeast, or animal cells) in large tanks called bioreactors and inducing them to produce a protein that serves as a medicine. That protein then must be separated from other cellular components and purified by using techniques that exploit its properties to isolate it away from other cellular proteins. Technicians use analytical techniques to prove the purity of the isolated protein. In the future, biomanufacturing will be expanded to include the industrial production of biofuels, biomaterials, stem cells, and other products currently manufactured using chemical rather than biological techniques.

To carry out biomanufacturing successfully, employees must use a multi-disciplinary approach with knowledge of scientific concepts, engineering principles, sound business practices, quality control models, and regulatory compliance requirements that allow companies to conform to the laws and regulations of the United States and other countries. Knowledge of the regulations

imposed upon pharmaceutical manufacturing by the Food and Drug Administration and by the equivalent agencies in other countries is especially important. Typically, many of these positions, especially in Quality Control and Quality Assurance, require a Bachelor's degree.

The courses of the Biomanufacturing baccalaureate will better prepare students for work within the biotechnology industry where a consistent and carefully controlled process assures a high quality product with zero defects. In this field, knowledge of quality and of regulatory compliance is as important as knowledge of the science. This proposed degree has embedded the quantitative analysis of biomanufacturing-process design and performance for quality assurance and continuous improvement.

In several of the proposed classes, the course curriculum will be designed to introduce potential opportunities for certification with external agencies or industry professional groups, as an ancillary to the upper division course content that is the focus of each course. It is important to note here that upper division coursework in biomanufacturing is not primarily designed to teach to industry certifications. Instead, aspects of the upper division curriculum and the professional certification exams emphasize knowledge required to be successful in this career field. It is a test of relevance of our program that subjects covered by professional certifications are a subset of the upper division curriculum. Too, it is in the interest of the student to make this correlation for purposes of industry compatibility and career placement and advancement, key criteria of the bachelor pilot degrees.

This incorporation of industry standards into academic curriculum design is not uncommon in the sciences at SCCD and elsewhere. For example, this approach is also used in the design of two- and four-year college chemistry courses: The American Chemical Society (ACS) recommends key curricular elements for organic and inorganic chemistry to universities and colleges, including CSU and UC. Local scores on exams linked to this recommended curriculum are therefore also often used in assessments of the effectiveness of curriculum and pedagogy as it relates to articulation and transfer as well as degree conferral. Likewise, acknowledging external standards provides additional, important assessment data on the curriculum and pedagogical design of the course, as well as contributing to the credibility of the curriculum for the external, professional community.

The certifications that biomanufacturing baccalaureate students would be eligible to pursue are elite certifications in the field and would contribute positively to a graduate's qualifications, employability and mobility when coupled with a Bachelor of Science degree. Indeed, within the discipline of Biomanufacturing, it is very desirable to earn quality certifications, as they indicate rigorous training, education and/or work experience to the industry. Current eligibility for these exams is determined through appropriate background consisting of education and/or work experience. For example, the prerequisites for the American Society for Quality's Quality Improvement Associate is the conferral of an associate degree or its equivalent. Other certification exams require even more evidence of successful completion: The Project Management Professional Certification from the Project Management Institute requires either an associate degree and 7,500 hours of project management experience, or a Bachelor's degree and 4,500 hours of project management experience. The degree of rigor required to earn these certifications is the reason that the certifications have earned the respect that they are given in the industry. The Bachelor of Science in Biomanufacturing would provide readiness for the certification exams listed below.

<b>Certification</b>	<b>Level</b>	<b>Professional Organization</b>	<b>Examination</b>	<b>Prerequisite or Requirement</b>
CPIM Supply Chain		APICS	Proctored, in person 5 cert. exams	2 years' experience recommended
Six Sigma	Yellow or Green Belt	IASSC or ASQ	Proctored, in person, 3-hour exam	ASQ GB requires project and 3 years' experience
Lean Manufacturing	Bronze	AME	In person or online exam	Portfolio of work
CQIA Quality Associate		AQS	In person, proctored, 3-hour exam	Associate Degree or equivalent
PMP		PMI	4-hour proctored exam	AS + 7,500 hours or BS +4,500 hours

*AQS: American Society for Quality*

*APCS: American Production and Inventory Control Society*

*AME: Association for Manufacturing Excellence*

*IASSC: International Association for Six Sigma Certification*

*PMI: Project Management Institute*

This aspect of student readiness is particularly compelling to our industry partners. Not only are our advisors from industry enthusiastic about the approach, but the linkage between portions of our upper division curriculum and industry standards gains us tremendous credibility contributing to program success when defined not only through completion but also career placement and advancement, a core element of the baccalaureate degree pilot.

The proposed upper division curriculum for the Bachelor of Science in Biomanufacturing allows students the opportunity to sit for exams and earn one or more of these certifications, which dramatically improves their professional standing, their prospects to be hired, and their upward mobility. At the same time, the prospect of graduates earning these certifications gains the baccalaureate degree increased credibility and enhances the meaning of the degree to the professional community. The inclusion of industry standards contributes to the overall success of the proposed program, especially when combined with the main elements of the curriculum and

our approval processes, thereby assuring sufficient depth, rigor and currency, hallmarks of upper division curriculum.

Shown below is the proposed baccalaureate program that builds upon the existing Solano College programs in Industrial Biotechnology. The Bachelor's degree will require the completion of either the Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education (CSU-GE) lower division pattern. The program adds ten (10) upper division classes in the major, and adds three (3) upper division General Education classes from disciplines outside of the major.

## Biomanufacturing Bachelor of Science Degree

**Table 1: Lower Division Major Courses/Units**

Lower Division Courses	Units
Biological Sciences 2, Principles of Cell and Molecular Biology	5
Chemistry 1, General Chemistry	5
Mathematics 11, Statistics or Biostatistics	4
Biotechnology 52, Business and Regulatory Principles of Biotechnology	3
Biotechnology 51, Principles in Biotechnology	3
Biotechnology 62, Cell Culture and Protein Recovery (laboratory)	4
Biotechnology 63, Quality Control and Genetic Engineering (laboratory)	4
Total Lower Division Major Units	28
Lower Division GE	38
Total Lower Division Units	66
Units that can be double-counted	-10
Total Major and GE Lower Division Units	56
Plus Electives	4
Total Lower Division Units	60

The lower division program is up for its periodic curriculum review process during the 2016-17 academic year, and a review of student learning outcomes (SLOs) comprises an integral part of that review. Current lower-division course SLOs and Program Learning Outcomes (PLOs) will receive a rigorous review during that time. In addition, where appropriate, these courses will be reviewed and updated to conform to statewide standards, in compliance with the Course Identification Descriptors (C-ID) and CCCCCO approval.

Table 2 below gives the course designators, course titles, brief descriptions of course content, and unit values for the core upper division courses proposed for the baccalaureate Biomanufacturing degree to be offered in the new Biotechnology building at the Solano College Vacaville Center.

**Table 2: Upper Division Major Courses/Units**

<b>Biomanufacturing Upper Division</b>	
<p><b>Biomanufacturing Process Sciences (Lecture/Lab) BIOT 401 (5 Units)</b></p> <ul style="list-style-type: none"> <li>Physical and chemical principles of biochemical engineering that enable large cell culture</li> <li>Thermodynamics and the properties of fluids; mass and heat transfer, fluid flow, and the energy relationships in fluid systems</li> <li>Biomanufacturing technologies enabling large scale upstream and downstream processes</li> </ul>	<p><b>Supply Chain and Enterprise Resource Planning (Lecture) BIOT 406 (3 Units)</b></p> <ul style="list-style-type: none"> <li>Manage flow of materials in a supply chain</li> <li>Understand the design, planning and execution of raw material procurement and use</li> <li>Eligibility for certification test</li> </ul>
<p><b>Design of Experiments for Biomanufacturing (Lecture/Lab) BIOT 402 (4 Units)</b></p> <ul style="list-style-type: none"> <li>Established methods to systematically vary process parameters to improve and optimize a biomanufacturing process</li> </ul>	<p><b>Advanced Topics in Quality Assurance and Regulatory Affairs (Lecture) BIOT 407 (4 Units)</b></p> <ul style="list-style-type: none"> <li>Study of the harmonized quality system approaches of ICH Q8, 9, 10, and 11, including quality risk management, qualification, and validation</li> </ul>
<p><b>Design of Biomanufacturing Facilities, Critical Utilities, Processes, and Equipment (Lecture) BIOT 403 (4 Units)</b></p> <ul style="list-style-type: none"> <li>An examination of how the robust design of all aspects of a biomanufacturing facility minimizes errors</li> <li>The role of Quality by Design (ICH Q8) in facility design</li> <li>Processes and equipment in biological production, recovery, and purification.</li> <li>Aseptic process design.</li> <li>Clean utility and support systems</li> </ul>	<p><b>Six Sigma and Lean Manufacturing (Lecture/Discussion) BIOT 408 (4 Units)</b></p> <ul style="list-style-type: none"> <li>Study of key Six Sigma concepts and tools; the DMAIC phases: design, measure, analyze, improve, and control</li> <li>Use and implementation of lean tools to reduce waste</li> <li>Completion of this course prepares students to earn a certification in Six Sigma</li> </ul>
<p><b>Bioprocess Monitoring and Control (Lecture/Lab) BIOT 404 (5 Units)</b></p> <ul style="list-style-type: none"> <li>The measurement, monitoring, modeling, and control of biomanufacturing processes</li> </ul>	<p><b>Methods in Quality Improvements, Investigations, and Audits (Lecture) BIOT 409 (4 Units)</b></p> <ul style="list-style-type: none"> <li>The study of continuous quality improvement techniques, including investigational methods into process deviations</li> </ul>
<p><b>Emerging Biomanufacturing Technologies (Seminar) BIOT 405 (3 Units)</b></p> <ul style="list-style-type: none"> <li>An examination of new technologies in biological production and purification operations</li> </ul>	<p><b>Emerging Trends in Biomanufacturing Quality (Seminar) BIOT 410 (3 Units)</b></p> <ul style="list-style-type: none"> <li>An examination of new regulatory requirements and changes to current practices in biomanufacturing quality</li> </ul>

In addition to the ten (10) upper division major courses, students seeking to complete the Biomanufacturing Bachelor’s degree will be required to take three (3) upper division General Education courses.

**Table 3: Upper Division General Education Courses/Units**

Course Title	Course Description	Units
English 451, Advanced Technical Writing	Concentrated work in technical writing focused on communicating the results of technical work at a high level of competence	3
Business 400, Project Management	Core characteristics of project management including planning, execution, monitoring and control	3
Philosophy 400, Bioethics	Application of ethical theories to contemporary bioethics issues and problems	3
Total Upper Division General Education Units		9

Student Learning Outcomes and assessment methods have been identified for all the upper division courses within the Bachelor’s degree program in Biomanufacturing ([Appendix D](#)). All courses have been approved through the Solano College Academic Senate’s curriculum approval process, with summarized course outlines included in this proposal ([Appendix D.1](#)).

To summarize the program description and course sequencing, the program first focuses on the science and technology used in biological production, emphasizing the statistical analysis and process control strategies used in Biomanufacturing. An additional area of focus then addresses sound engineering and business designs to assure product quality and compliance with the laws and regulations applied by regulatory agencies in pharmaceutical manufacturing. Using these practices, biomanufacturing companies assure the identity, safety, efficacy, purity, and stability of their product. Pharmaceutical biomanufacturing is a zero-defect business: since these products are parenteral drugs manufactured to be injected into patients, no mistakes are tolerated. Students will learn how these principles create the robust processes that assure zero-defects. Finally, the majors program focuses on emerging topics, regulatory issues, and resource planning to ensure students are aware of the latest industry issues and quality assurance procedures. The General Education courses provide students with higher level thinking and analytical skills within the context of scientific and business-related contexts and applications. Program Learning Outcomes have been identified for the two major focal areas of the program, quality focus and manufacturing processes ([Appendix D.2](#)).

### Design of Upper Division Courses (Level, Rigor, Appropriateness)

The rigor of each upper division course has been evaluated by the Solano College Curriculum Committee during the approval process and found to be of sufficient rigor to be considered upper

division. For each course, the supplementary form examined the course for its depth/focus, specialization, refinement, preparation, and capstone elements. This section applies an analysis of the same elements to the baccalaureate program:

1. Depth/Focus: student outcomes include the development and understanding of the theories and methods of the discipline which may include the applications and limitations of those theories.

Each and every course in the program requires a depth that requires the students to apply the knowledge and skills that they gained in their lower division courses. This prior knowledge is essential for success in the upper division course. Each course takes a subject that was introduced as a small part of the lower division program, focuses upon it, and expands the discussion to a full semester by covering the subject in detail.

2. Specialization: student outcomes include specific intellectual and professional abilities to enable success or progress in a particular field or professional practice.

Each course covers a very specialized subject. Again, the course takes a subject that was introduced in the lower division program and covers it as a specialty using advanced discussions of equipment, facilities, engineering principles, and business strategies and approaches.

3. Refinement: students are able to build upon the “general education” background noted above the application of these skills in more discerning or challenging contexts.

Each course takes what the students learned in lower division in the context of a lower level Bloom’s taxonomy (just learning and understanding the information) and then challenges them with an activity (a project or assignment) that demands higher level Bloom’s taxonomy; the students are required to create an idea, or critically evaluate someone else’s idea.

4. Preparation: prerequisites may include more general courses, student class standing, GPA requirements, or admission to a pre-professional program.

Without the knowledge of the biotechnology industry, its technologies and quality approaches, acquired in the lower division program, students would certainly fail. This applies to each course.

5. Capstone Courses/Projects: though not necessarily specialized or focused on in-depth study of one discipline, student outcomes may have an integrative function wherein students integrate knowledge from earlier studies. Moreover, upper-division course-level outcomes in capstone courses may correspond to program-level outcomes.

Taken together, it is the opinion of the faculty proposing this program and of the members of the Curriculum Committee who reviewed and approved the courses that each course within with proposed program meets the rigor to be called “upper division.”



In preparing course and the program, Solano College faculty members and administrators have been engaged in an intense discussion of the degree of rigor required to consider a junior or senior level class to be worthy of being called “upper division.” The faculty recognizes that this discussion lies at the core of the success of the 15 pilot baccalaureate programs in California, and will impact their credibility and acceptance by industry. This conversation has been carried out at the local level and at the regional level with Solano faculty and with faculty and administrators from other colleges. Full course outlines are included as [Appendix E](#).

In discussing the issue of upper division rigor with other colleges that are part of the pilot program, Solano College faculty have agreed to adhere to the standard set by the California Academic Senate in their plenary in November 2015, stated in Resolution Number 09.02:

Whereas, No perceived difference in breadth, rigor, and utility should exist between the quality of a baccalaureate degree offered by the California community colleges and those offered in any other segment of the California higher education...State Academic Senate Resolution

The Solano College Academic Senate endorsed all of the resolutions reached by the Statewide Senate in their meeting on November 16, 2015 (RESOLUTION 11.16.2015.2) and the resolution passed unanimously.

On January 28, 2016, faculty and administrators from all 15 colleges involved in the Bachelor’s Degree Pilot programs met in Sacramento to continue the conversation at the state level. This conference was sponsored by the California Community College Chancellor’s Office.

The California Community College Chancellors Office (CCCCO) has developed a Bachelor’s Degree Pilot Handbook that discusses upper division coursework. In addition, the Solano College Academic Senate has developed a new process to review courses for the Biomanufacturing baccalaureate degree that would be considered upper division.

The [Bachelor’s Degree Pilot Handbook](#) uses the following Upper Division course definition:

Upper division courses are defined as requiring lower division knowledge and applying that knowledge as demonstrated measures of critical thinking through writing, oral communication, or computation. Upper division coursework may also encompass research elements, workforce training, apprenticeships, internships, required practicum, or capstone projects. Upper division courses typically will have one or [more] lower division or upper division prerequisites that have been established using content review of the entry skills necessary to be successful as outlined in the California Code of Regulations (CCR), title 5, section 55003. Courses that have been designated as upper division are only applicable to baccalaureate degrees and may not be used to satisfy associate degree requirements ([Appendix F](#)).

The Solano College Academic Senate has adopted a document called “Curriculum Process for Upper Division Course Work” which includes the additional procedures required for our local Academic Senate to approve an upper division course. Every course seeking this designation would be required to undergo an additional approval process guided by an additional form. This document defines upper division as:

Solano Community College defines upper division coursework as requiring lower division knowledge and applying that knowledge as demonstrated measures of critical thinking through writing, oral communication, or computation, and allow that upper division coursework may encompass research elements, workforce training, apprenticeships, internships, required practicum, or capstone projects.

The upper-division course work will require application of higher level and critical thinking. Students will demonstrate their mastery in lecture examinations, laboratory activities, written assignments, and an analysis of readings. Each course will require each student to demonstrate this integration of knowledge through computations, writing, and oral presentations.

Each of the ten courses in the major and each of the three General Education courses under consideration for approval by the Curriculum Committee of the Academic Senate must include in the submission materials an upper division course work form that includes the completion of an upper division rubric ([Appendix G](#)). All Biomanufacturing courses approved by the Academic Senate and the Solano Board of Trustees will be subsequently submitted to the Chancellor's Office.

All upper division courses for the baccalaureate program in biomanufacturing, as well as the nine (9) units of upper division general education, have been approved by the Solano College Curriculum Committee and the SCCD Board of Trustees. Upper division curriculum was approved by the SCCD Curriculum Committee on April 26, 2016 ([Appendix G.1.](#)) and May 10, 2016 ([Appendix G.2.](#)). SCCD Board of Trustees approved the curriculum at its meeting on June 1, 2016 ([Appendix G.3.](#) and [Appendix G.4.](#)).

The Curriculum Committee has subsequently reviewed and approved the culminating Bachelor of Science program as has the SCCD Board of Trustees. The Bachelor of Science in Biomanufacturing degree program was approved by the SCC Curriculum Committee on August 16, 2016 ([Appendix G.4.](#)). SCCD Board of Trustees approved the program at its meeting on August 17, 2016 ([Appendix G.5.](#)).

All courses individually as well as the baccalaureate program in total have been subsequently forwarded to the CCCC for its approval. Approved courses were submitted on June 2, 2016. The approved program was submitted on August 18, 2016.

In its review and approval of these courses and culminating program, the SCCD Curriculum Committee exercised the Curriculum Process for Upper Division programs previously adopted by the SCC Academic Senate, as described above. This process includes the application of extensive additional criteria for upper division coursework and programs, as well as a corresponding rubric, to assess upper division courses and the corresponding program for sufficient depth and rigor. Discipline faculty proposing new upper division courses, as well as the baccalaureate program in biomanufacturing, are asked to provide sufficient compelling justifications for upper division using the Upper Division Course Work form. Upper division courses are assessed for Depth/Focus, Specialization, Refinement, Preparation, and/or the integration of Capstone Courses/Projects.

During the review process for course approval, proposed curriculum underwent a rigorous and thorough vetting process, including first readings by the Technical Review subcommittee of the

Curriculum Committee, as well as extensive review and discussion by the Curriculum Committee wherein discipline faculty defended successfully proposed upper division curriculum.

## Program Length

The design of the Bachelor of Science in Biomanufacturing will allow students to complete the Bachelor’s degree at 120 units in four years. The upper division courses build upon the existing Associate of Science in Industrial Biotechnology program that has been designed to be completed with 60 units in two years. The program is designed as a “two plus two” program in which students first earn the associate degree, then as admitted students into the upper division coursework, complete the Bachelor’s degree.

Prior to enrolling in the program, students will be given the baccalaureate course requirements as well as a two-year education plan of specific major course offerings. Counselors can help the students map the sequencing of their courses. With proper planning and support, a full-time student will be able to complete the 120-unit baccalaureate degree in four years. The course of study for the Bachelor’s degree is designed as a full-time, cohort program. Students accepted into the program will follow a planned schedule of courses. Re-admission policies for students who leave the program prior to completion will follow closely our Nursing program re-admission policies. In short, students must apply for re-admission after exiting the program, and depending on successful passage of pre-requisite courses and contingent on space available, may re-enter the program. Table 4 shows the two-year, four semester proposed Biomanufacturing program.

**Table 4: Two Year, Four Semester Program Length and Proposed Sequence of Course Offerings for initial Biomanufacturing cohort that will begin in Fall 2017**

See Summary Course Outlines in [Appendix D](#), and Full Course Outlines in [Appendix E](#).

<b>Lower Division</b>	Biotechnology Associate Degree or equivalent preparation	
<b>Upper Division, Year One</b>	<p><b>Fall Term</b></p> <ul style="list-style-type: none"> <li>• Biomanufacturing Process Sciences- BIOT401 (5 Units)</li> <li>• Advanced Topics in Quality Assurance and Regulatory Affairs BIOT407 (4 Units)</li> <li>• Upper division GE: Technical Writing ENG451 (3 Units)</li> <li>• Elective (3 Units)</li> </ul>	<p><b>Spring Term</b></p> <ol style="list-style-type: none"> <li>1. Design of Biomanufacturing Facilities, Critical Utilities, Processes and Equipment BIOT403 (4 Units)</li> <li>2. Bioprocess Monitoring and Control BIOT404 (5 Units)</li> <li>3. Design of Experiments for Biomanufacturing BIOT402 (4 Units)</li> <li>4. Elective ( 3 Units)</li> </ol>
<b>Upper Division, Year Two</b>	<p><b>Fall Term</b></p> <ol style="list-style-type: none"> <li>1. Supply Chain and Enterprise Resource Planning BIOT 406 (3 Units)</li> <li>2. Emerging Biomanufacturing Technologies BIOT405 (3 Units)</li> <li>3. Six Sigma and Lean Manufacturing BIOT408 (4 Units)</li> <li>4. Upper division GE: Bioethics PHIL 400 (3 Units)</li> <li>5. Electives (3 Units)</li> </ol>	<p><b>Spring Term</b></p> <ol style="list-style-type: none"> <li>1. Methods in Quality Improvements, Investigations and Audits BIOT409 (4 Units)</li> <li>2. Emerging Trends in Biomanufacturing Quality BIOT410 (3 Units)</li> <li>1. Upper division GE: Project Management and Enterprise Resource Planning BUS400 (3 Units)</li> <li>2. Elective (3 Units)</li> </ol>

## Course Numbering, TOP Codes, and Repeatability

In the design of the courses for this program the faculty used 400 level to indicate an upper division course. The 400 level was a category that the college did not already utilize for any course designations.

While there are no TOP codes for upper division course work, the courses in this major will use the Taxonomy of Programs codes that are used in the lower division biotechnology courses. Lower division biotechnology courses use the TOP code: 0430.00 – Biotechnology and Biomedical Technology.

Using the crosswalk developed by the Chancellors office, the CIP code for this would be: 15.0401 Biomedical Technology/Technician.

Each of these courses has been designated “non-repeatable” during the review process of the Academic Senate’s curriculum committee. Repeat of these courses will not be offered except as allowed by statute.

## Instructional Delivery

Upper-division biomanufacturing and general education course work will be offered in a lecture or laboratory format through a traditional face-to-face delivery mode. In the future, as the program expands, the College may explore distance education or hybrid formats to provide the flexibility required for incumbent training and to reach working adults. Solano College’s Academic Senate Curriculum Committee and the College’s Distance Education Committee enforce strict requirements for classes to be offered in a distance education or a hybrid format and provide a rigorous review of any proposal as well as requiring training for instructors interested in teaching through distance delivery.

Laboratory courses will be delivered face-to-face with hands-on instruction and practice. Assignments will include research papers with technical writing components, individual and group projects, and other authentic assessments of student learning. A sample Grading Rubric for BIOT 401 is shown in [Appendix G. 1](#). Students will have access to the library and supplemental instruction as well as counseling services and other student support services.

## C. A Description of the Planning Process Which Led to the Request for the Change

The Senate Bill from the California legislature that authorized this program and the process generated by the California Community College Chancellor's Office to implement it generated a very short timeline for planning. California Governor Jerry Brown signed the authorizing bill on September 28, 2014 and the Chancellor's Office gave a deadline for a full and detailed proposal of December 19, 2014. However, the brief proposal timeframe turned out to be useful, after approval and during the implementation phase, because the details required in the application required multiple in-depth discussions about the design of the program before the submission of the application.

Solano College started its discussion regarding offering a Bachelor's degree soon after the announced opportunity. At the October 1, 2014 meeting of the Board of Trustees, a meeting that shortly followed Governor Jerry Brown's September 28, 2014 signature on the enabling bill, then-Superintendent/President Jewel Laguerre expressed to the Board that Solano College would have to decide whether to submit an application to become one of the fifteen colleges to pilot this program ([Appendix H](#)).

The Board expressed enthusiasm in pursuing an application and the Superintendent/President initiated a discussion with campus committees. These committees (President's Cabinet and the 10+1 Committee) discussed the issue, and after a discussion at the Academic Deans' meeting on November 12, 2014, the Deans determined that the college had the capacity to offer a Bachelor's degree and formally made the decision to support the decision to apply ([Appendix I](#)).

The College began planning for the Bachelor's degree in Fall 2014 and filed a Letter of Intent to Apply, as recorded in the Academic Senate minutes of their November 17, 2014 meeting (Nov. 17, 2014 [Solano College Academic Senate Meeting Minutes](#)). At this meeting, the Academic Senate also began their discussion of upper division General Education requirements for a Bachelor's program. The Academic Senate President and then-Superintendent/President Laguerre updated the Board on the progress of the Bachelor's degree discussion at their November 19, 2014 meeting, as noted earlier in this document.

The Academic Affairs Division of the Chancellor's Office released the Baccalaureate Degree Pilot Program application on November 21, 2014. Solano College originally intended to apply for a Bachelor's degree in applied engineering, incorporating Solano College's strong water and wastewater treatment program. The water and wastewater treatment program currently trains technicians to run the water purification plants and the wastewater treatment for the entire San Francisco Bay area. The industry advisory committee for this program was very interested in extending it into engineering and had discussed a collaboration with California State University, East Bay administration and faculty.

After further discussion, the Academic Senate President and the Academic Senate, in consultation with the then-Superintendent/President, decided to open for campus-wide discussion the consideration of which field to pursue and to solicit proposals from faculty. Campus

constituent groups then decided on a best-fit program for Solano College based on feasibility and availability of resources, interest and support.

From that point forward, the Academic Senate President participated in all webinars and all statewide discussions of a Bachelor's degree. The Biotechnology faculty communicated an interest in offering a Bachelor's degree and began to draft a proposal. The proposal was written in close collaboration with MiraCosta College as the two colleges had been sharing expertise for over a decade. The proposal was submitted to the Chancellor's Office on December 19, 2014. This first proposal was not successful and Solano College was not one of the initial fifteen colleges chosen in the announcement on January 20, 2015.

Three of the original 15 selected programs, Crafton Hills College, Santa Monica College, and Rio Hondo College, withdrew from the pilot program. The Chancellor's Office then reopened the application process. Solano College resubmitted its application on April 16, 2015 and the Chancellor's Office requested a supplemental application on May 5, 2015. Professor James DeKloe reported to the Board at their May 6, 2015 meeting that a new application had been submitted for Biomanufacturing. The Board of Governors for California Community Colleges approved Solano College's application unanimously at their May 18, 2015 meeting ([Appendix T](#)) and then announced the final decisions in a press release [Bachelor's Degree Press Release](#) to the community.

At their May 20, 2015 meeting, Superintendent/President Jowel Laguerre and Professor DeKloe were able to report that the California Community College Board of Governors had selected Solano Community College to be one of the fifteen colleges to pilot a program. Board President Young remarked at that meeting that being awarded this opportunity has been the highlight of her many years (over 30 years) of service to the college. A formal notification and congratulations came from Chancellor Brice Harris, dated October 23, 2015 ([Appendix J](#)).

As part of its planning process for the baccalaureate program in Biomanufacturing, the College prepared a Program Planning and Implementation chart to ensure a quality student program, and timeliness and integration with all academic and administrative processes. ([Charts 1 & 2](#)).

With the second proposal ([Appendix K](#)) and the supplemental application ([Appendix L](#)) Solano College is now filing this substantive change report with the Commission as the initial stage of securing accreditation for the baccalaureate program in Biomanufacturing.

**D. Evidence that the institution has analyzed, has the capacity, and has provided for adequate human, administrative, financial, and physical resources and processes necessary to initiate, maintain, and monitor the baccalaureate program and to assure that the activities undertaken are accomplished with acceptable quality**

Solano College evaluated the requirements to implement this program and concluded that the college possesses the resources required to offer, support, and oversee the baccalaureate program in a sustainable manner. The College recognizes the scope and sufficiency of human, administrative, financial and physical resources needed to offer the baccalaureate program and has carefully assessed the following organizational capacities and processes to ensure it can do so in a quality manner.

**1. Adequate and accessible student support services**

For the implementation of this Bachelor's degree, the College has formed the Admissions, Counseling, and Student Services Subcommittee to plan the suite of student services that will be offered to the students within this program. It is the charge of this committee to assure that baccalaureate students will have access to the full array of student support services and will receive additional services specifically designed for the Biomanufacturing program. These services will include admissions (enrollment and matriculation services), counseling, financial aid, veterans' services, library services, reading and writing labs, math lab, disability services, and various support workshops. The planned facilities on the Vacaville campus will be staffed to allow student access to all of the student services available on campus.

To maximize student success in the program, the College will assure that each student receives the appropriate student support services specific to this program. Baccalaureate students will receive admissions, evaluation, counseling, and tutoring support throughout the program to provide critical elements to student success beginning with educational plan development (including recommended semester-by-semester pathways) and continuing until graduation.

Solano will designate a portion of a full-time faculty counselor to provide individualized counseling support for baccalaureate students. In addition, the College will contract with senior institution graduate students or alumni who can provide higher-level tutoring support for baccalaureate courses. Other identified departments of the college, including Career Studies and Services, Veterans Services, Student Activities, Testing, Service Learning, Health Services, College Police, and Disabled Student Programs and Services, are preparing to support baccalaureate students.

The Solano College Financial Aid Office and its Veterans Affairs office will work with the statewide bachelor's degree financial aid task force to assure that bachelor's degree-granting institutions are authorized by the federal government to provide federal financial aid to baccalaureate students. Financial Aid staff members are qualified and trained to serve the federal aid, state aid, and local scholarship needs of baccalaureate students.

## 2. Sufficient faculty, management, and support staff (Human Resources)

Solano has sufficient faculty, management, and staff to support the new Biomanufacturing program. As of fall 2015, there are currently three full time faculty, three adjunct faculty members, and two classified staff laboratory technicians identified to provide instruction to the program. The Dean of Math and Sciences provides the management oversight. The Vice President of Academic Affairs oversees all instructional activities. Solano College, in its application to the Chancellor's Office, committed to the hiring of an additional full time faculty member who will be dedicated to instruction and ongoing course development for the program. The new course curriculum for the upper division major courses in the baccalaureate program is being developed by two of the full time faculty members in extensive consultation with industry experts and the College's Biomanufacturing Baccalaureate Implementation Advisory Committee. Deans and faculty members in other areas of the college, specifically English, Philosophy, Business, and Health Sciences are developing curriculum for the general education courses. The advisory committee is chaired by Biotechnology Professor Jim DeKloe who planned and implemented the current associate degree and certificates in Biotechnology and who has been at Solano College for twenty-six years.

The Biotechnology Department faculty also includes Dr. Edward Re who has been on the faculty for eleven years. The department is also supported by a technician, Jennifer Low, who manages the laboratory equipment and supplies and who prepares the biotechnology labs on the main campus. Christine Kucala has comparable duties on the Vacaville campus. Solano College will provide professors DeKloe and Re or other selected faculty members with appropriate release time to implement this program and to provide program oversight and departmental leadership.

Administrative support of the program will be the responsibility of the Dean of Mathematics and Science, who will directly oversee the program's development and implementation. At the executive level, the program will be supported by the Vice President of Academic Affairs, the Vice President of Student Services, and the Vice President of Finance and Administration. Dr. Celia Esposito-Noy, Superintendent/President, has eight years' experience in community college leadership and was recently selected and hired by the Solano College Board of Trustees as the new Superintendent/President of the college, taking on this role in January 2016. A College organizational chart depicts the administrative structure ([Appendix M](#)).

## 3. Professional development for faculty

The faculty members in the Biotechnology department undergo extensive professional development every year, on site at the College, in university settings off site, and in regional or national conferences. To implement the baccalaureate degree, the faculty have written a professional development plan that will cover training in all of the subjects to be covered in upper division. These training opportunities will be carried out by the Biomanufacturing Training and Education Center at North Carolina State University, the American Chemical Society, the Northeast Biomanufacturing Center and Collaborative, and other colleges and universities. Topics include:

1. Single Use Bioreactors
2. Chemical Engineering for Chemists



3. Supply chain and lean manufacturing
4. Quality Assurance and Quality Control in a Regulated Environment
5. Process Control and Programmable Logic Circuits
6. Project Management
7. SAP Enterprise Management software
8. Algal Biofuels
9. Stem Cell Biology and Techniques

Professional development monies are available from the state. The California legislature has authorized \$6 million for the 15 colleges with the Chancellor's Office devoting \$350,000 to each of the 15 colleges in the pilot program. These monies have been earmarked for activities that assist in development of the program, including professional development. The Science Department has a \$200,000 National Science Foundation Advanced Technological Education grant to augment training, as well ([Appendix N](#)).

The College also provides faculty professional development funds upon application by faculty, disbursed through the Academic Senate. With all of these funding streams, the College is committed to having their faculty participate in extensive professional development activities and ensuring a quality Biomanufacturing educational program.

#### 4. Appropriate equipment and facilities including technology (Physical Resources and Processes)

One of the strongest areas that supports the proposed program is its physical resources, due to the planned construction of a new Biotech/Science Building at the existing Vacaville Center. Currently, the Biotechnology certificate and associate degree programs are being taught in one location, Room 1852 on the main campus. This 2650 square foot facility is a refurbished facility and dedicated teaching laboratory space. The lab is fully equipped with state-of-the-art biotech process equipment and instruments.

In November of 2012, the residents of Solano County and part of Yolo County passed Measure Q, a \$348 million Bond to support facilities and other improvement at Solano College. The first new building of Measure Q to be constructed is the Biotechnology/Science building at the Vacaville Center, which is located across the street from Genentech, a major biotech company. The building is slated to open in August 2017, just in time to offer upper division classes in the proposed baccalaureate program in Biomanufacturing. This new 32,000 square foot biotechnology/science facility will contain four bioprocessing suites, one for cell culture, one for bioreactors, one for recovery equipment, and one for the teaching of quality control methods. These suites will be populated with approximately \$2 million of equipment, including biosafety cabinets, bioreactors (both stainless steel and single-use), cell disruptors, centrifuges, chromatography systems, and tangential flow filtration units. Planned and purchased equipment and furniture in the lab suites are listed in detail in [Appendix O](#). A floor plan is also provided in [Appendix P](#).

The facility and each bioprocessing suite within it are designed to model personnel flow and material flow so the building design itself serves as a teaching tool. Each suite will accommodate 24 students who will work in a team-based environment. Materials will be cleaned and sterilized in the preparation rooms and will be passed through an in-wall autoclave into the rooms where

they will be used. The cell culture suite contains a set of biosafety cabinets and CO2 incubators where small cultures will be prepared and grown to be used later (these are called the seed train cell cultures). From there the process moves into process-controlled bioreactors. The bioreactor suite has six 3-liter bioreactors, two 20-liter bioreactors, and a 100-liter bioreactor. Finally, the process is completed with recovery and purifications with several centrifuges, a cell disruption unit, and a GE Akta Explorer Fast Process Liquid column chromatography system and a BioRad BioLogic LP chromatography system.

The Biotechnology Department's associate degree and certificate programs are well equipped to meet the resource requirements for the Biomanufacturing baccalaureate program without taking away from existing programs. The current biotechnology degree program has earned grant funds totaling more than \$190,000 for 2014-2016 with \$60,000 in equipment funds ([Appendix N](#) and [Q](#)). These funds were used to augment needed equipment for existing labs and the equipment was specified such that it will be leveraged for future upper-division course work. Solano College just acquired the latest \$65,000 single-use bioreactor system: the BIOFLO\_320\_CS, Configurable BioFlo 320 System, as part of an NSF ATE grant.

The close proximity to Genentech will also provide ample opportunities for our students to conduct field trips and gain real world experience. Genentech has already donated some equipment to the College's Biotech department. The program will rely on Genentech and other industry professionals in the region to serve on its Advisory Committee and provide a bridge from the college to industry.

Solano College has the technology resources to support the Biomanufacturing program. The Technology Services and Support (TSS) Department is responsible for ensuring the College has the necessary hardware, software, and technical staff in place to support the needs of the new baccalaureate. TSS supports all administrative and instructional technology requirements for SCCD. The infrastructure includes a data center that house servers and network equipment and of about 2200 personal computers.

All learning spaces and classrooms are technology-enhanced with data projectors, computers, miscellaneous media equipment, and wireless connections accessible across all College sites by all registered students. Educational technology (e.g., Canvas, Minitab, Microsoft Office, and Adobe Creative Suite) is in place and will be available to all baccalaureate students. Solano uses the Ellucian Banner Enterprise Resource Planning software as its student information system. This software also supports human resources and fiscal services. TSS coordinates the evaluation of technology growth, upgrade, replacement, and sustainability. The department also systematically plans, acquires, maintains, upgrades, and replaces the technology infrastructure to meet Solano's operational, instructional, and programmatic needs.

The Technology Plan, currently undergoing revision, will provide the guidance for deployment of services and equipment for all technology at Solano. The College's integrated planning model and institutional program review process will ensure the technology plan is reviewed regularly and includes priorities for maintaining and the purchasing needed instructional and administrative equipment and software for the District. The baccalaureate program will benefit from these established resources and processes as TSS install, and assist in the support of any software identified by the baccalaureate program as dictated by curricular and programmatic needs.

## 5. Sustainable fiscal resources (Financial Resources)

Most of the financial resources of Solano College come from the State of California. Additional funding is obtained from federal, state and private sources. The college, through Board oversight, maintains adequate reserve levels for contingencies and maintains financial management policies and practices that ensure ongoing fiscal stability.

As part of the pilot program authorization, the Board of Governors authorized colleges to assess students an additional \$84 per unit for upper division classes that, along with the incremental apportionment funding associated with the baccalaureate program, is intended to be devoted toward expanding and running the program. And in combination with the State's designated baccalaureate start-up funding of \$350,000 and the expected ongoing associated apportionment funds, the College has determined these resources are adequate to develop, grow and sustain the program without adverse impact on the institution's budget.

## 6. Comparative Analysis of budget, enrollment and resources; identify new or reallocated funds

Solano College is closing FY 2015-16 with an approximate 16% general fund reserve, strengthening its financial base. The College further expects to reach a full time equivalent student (FTES) count of 8,574, intending to fully optimize access funding available this year. With the Governor's January 2016 message, the College also expects FY 2016-17 to add new revenues through access or growth funds, as well as significant increases in categorical resources, including student success, equity, instructional equipment and scheduled maintenance funding. On top of these revenue streams, many of which are ongoing, the institution also anticipates one-time monies to augment operational needs. Simultaneously many federal, state and local grants are being pursued to further increase and strengthen the district's revenue picture.

On the expenditure side, spending is within budget parameters and long range liabilities, including Other Post-Employment Benefits (OPEB) which are being addressed through increased contributions to an external irrevocable retiree medical health benefits liability fund. Thus the College's mid-range perspective, given the State's improved fiscal health, is optimistic.

## 7. Plan for monitoring achievement of desired outcomes

This program is subject to program review, as are all of the educational programs at the College. Student learning outcomes (SLO) appropriate for the upper division classes have been developed and approved by the Academic Senate's Curriculum Committee as a part of the curriculum approval process. As noted earlier, courses are currently being reviewed by the Chancellor's Office. SLOs will be assessed on the regular cycle of rotation. Whenever possible, the SLOs will be aligned with standards developed by a professional organization (e.g. American Society for Quality). After utilizing the SLOs, the faculty will evaluate their effectiveness as evidenced by student performance. SLOs are reviewed as a part of the curriculum review process which follows program review and occurs every two years for career technical education (CTE) programs, and every five years for college transfer programs.

## 8. Evaluation and assessment of student success, retention and completion.

An analysis of student success, retention, and completion rates is integral to the program review process. The College utilizes the student success scorecard to measure these outcomes. Modifications to curriculum are made in response to industry Advisory Board recommendations. Evaluation of the program will be consistent with current, rigorous program evaluation procedures. The program will produce its first comprehensive program review starting in Fall 2019, coinciding with the first graduating cohort. Program review is central to the College's overall planning, becoming the basis for goal setting, resource allocation, and needs assessment. The comprehensive self-study report will examine relationships to college mission and strategy, program and course level student learning outcome assessment results, program resources, program goals and planning as well as student success and equity data.

The program will also utilize the comprehensive and extensive cohort analysis systems currently in use via SLO assessment and publication of our Success Scorecard data. This will include analysis of student success, student retention and persistence as well as progression through the course sequence. These cohort models will be published at the end of every semester following posting of grades. The cohort model may be disaggregated by a number of student and course dimensions; this allows us to examine disproportionate impact by student demographics or course modality. These results will be published in a format specific to the Baccalaureate program and shared with the leadership team for review and appropriate action. It is important to note the MIS and Banner student information systems have been and/or will be updated to allow for baccalaureate student data collection and analysis (Chart 3).

The program will also utilize regular contact with the advisory board. The advisory board, consisting of faculty members and industry representatives, will review curricular offerings and make recommendations for improvement. As stated earlier in this document, the Advisory Committee is taking an active role in planning these activities and assessments toward outcomes, including Program Learning Outcomes and Institutional Learning Outcomes ([Appendix R](#), and [Appendix S](#)).

## E. Evidence that the institution has received all necessary internal and/or external approvals

### 1. Internal and External

At their October 1, 2014 meeting, then-Superintendent/President Jowel Laguerre reported to the Board of Trustees that California Governor Jerry Brown had just signed SB 850 into law on September 28, 2014. He expressed to the Board that Solano College would have to decide whether to submit an application to become one of the fifteen colleges to pilot this program. The Board informally expressed an enthusiasm to pursue an application and the President initiated a discussion with campus committees. These committees (the President's Cabinet and the 10+1 Committee) discussed the issue and determined that the college had the capacity to offer a Bachelor's degree. The college began planning for the Bachelor's degree in Fall 2014. The College filed its executed, official Letter of Intent to Apply with the Chancellor's Office in

November 2014. A formal Board statement of support is included in the Mission Statement revision item slated for the April 6, 2016 Board of Trustees agenda.

Solano College is accredited by the Accrediting Commission for Community and Junior Colleges (ACCJC), Western Association of Schools and Colleges (WASC). In February 2014, the College's accreditation was reaffirmed. Solano College is now filing this substantive change proposal with ACCJC as the initial stage of securing accreditation for the baccalaureate program in Biomanufacturing.

## 2. Verification the institution is authorized by its state/government to offer the proposed baccalaureate degree

At the May 18, 2015 California Community Colleges Board of Governors meeting, the members voted unanimously to approve Solano College's Biomanufacturing baccalaureate program as one of the additional three to add to the initial 12 community college pilot programs to be offered in the state ([Appendix T](#)).

## 3. There is sufficient demand for the program within the area served by the college

The future availability of jobs in the biotechnology sector in the San Francisco Bay Area, specifically in biomanufacturing, has been demonstrated by a variety of studies. These openings will include a variety of entry-level jobs, and the biotechnology industry represents an industry with an upwardly mobile career path. A recent study completed by the East Bay Biomedical Manufacturing Network (created in partnership with the Round 2 Design It-Build It-Ship It TAACCCT grant) also highlights the persistence and strength of this sector in the Bay Area including projected strong job growth, suggesting that the industry will generate 1,000 new jobs in the next two years alone, with growth expected to continue beyond that timeframe.

California is projected to have continued demand in the biosciences. The industry organization BayBio Institute published the definitive report on the California Biomedical Industry in 2014. This report emphasizes the strength and importance of the biomedical industry and cites its resilience during the financial crisis of 2008. The report places the estimated revenue generated by the industry at \$96 billion. Moreover, the report states: "In terms of total high-tech employees, the industry's nearly 267,000 are second only to the computer and peripherals enterprise" ([BayBio Labor Report](#), 2014).

According to an October 2014 study by the California Community Colleges Centers of Excellence for Labor Market Research (CCCCE):

*"...the life sciences/biotechnology sector has demonstrated that it is a strong and steady job generator, growing jobs over the past decade at a pace well above the national average. It also has fared much better than the overall economy through the recent U.S. recession and into the first few years of the recovery. A primary reason for the resiliency of biotechnology is the diverse set of markets it serves. These markets span biomedical drugs; diagnostics and devices; agricultural products from animal health to seeds and crop protection; and bio-based industrial products such as enzymes for industry chemical processes and bio-remediation, bio-fuels, and bio-plastics."*

Based upon 2013 data, there are approximately 17,000 people currently employed in these capacities, and current projections point to a 15 percent five-year growth rate with 950 annual openings. Based upon the current and projected strength of the industry in the Bay Area, including the projected need for Bachelor's degrees to meet the demands of this growth, Solano College is well positioned to meet the needs of the industry and the communities it serves in the field of biotechnology. Upon completion of the program, Solano College graduates will be well-positioned to successfully enter a biotechnology career.

Recent conversations and correspondence with local biotechnology companies confirms current and future employment potential for Solano College graduates. Solano College provides job placement for its biotechnology students at three main companies including Genentech Vacaville, BioMarin located in Novato, and Janssen, a subsidiary of Johnson and Johnson. Genentech Vacaville reports a workforce increase of 300 employees in the next three years (accompanying a \$258 million investment in new facilities). BioMarin anticipates a workforce increase of 1,500 over the next five years, and Janssen anticipates a consistent, stable demand made available through routine employee turnover.

A 2014 brief by CALifeScience calls the San Francisco Bay Area “the birthplace of biotechnology” and highlights that it is home to the largest and most productive concentration of biotech companies and employees in the world. The Life Science industry remains one of this region's dominant industries, with over 2,300 companies in the greater San Francisco Bay Area. Moreover, CALifeScience noted that “California's life sciences... [have] 7,500 companies [that] hire over 304,000 employees with an economy impact of over \$258 billion” (see <http://califesciences.org/industry-intelligence/>). The state has seen an employment increase of 36 percent since 2001, and the industry maintains its job growth potential.

Solano College views the establishment of community college Bachelor's degrees in this field to be critical for California to develop additional workforce capability to maintain its dominant position in this industry. The biotechnology programs in the Bay Area community colleges and throughout California have always shared curriculum and leveraged resources through the California Community College Chancellor's Office System. However, community college biotechnology courses in the Bay Area do not currently articulate to four-year colleges and universities. The Bay Area has robust programs at City College of San Francisco, Laney College, Ohlone College, Berkeley City College, Contra Costa College, and emerging programs at Skyline College, Foothill College, and The College of Marin. The establishment of a Bachelor of Science degree in Biomanufacturing will enable students from all of these colleges to apply to matriculate to Solano Community College without the risk of losing earned units for completed courses. This seamless transition presents a golden opportunity to save students time and money and allowing them to enter the workforce more quickly. Once in the industry, a worker with a Bachelor's degree enjoys a greater potential for upward mobility and higher income.

In the 2014 Talent Report on California Workforce Trends in the Life Science Industry, quantitative survey data and data collected by Burning Glass Technologies confirm that most positions in the industry require a four-year degree (55 percent based on the survey; 62 percent based on online job postings). Manufacturing positions in biotechnology were second only to research and development in hiring over the past two years and are projected to be among the highest in the next two years. Combined, this report's data substantiate the necessity of a four-

year degree in the field of Biomanufacturing (see <http://califesciencesinstitute.org/careers/workforce-trends/> ).

The projected starting hourly wage for students completing the baccalaureate is \$22.72. Experienced workers advancing into management have the potential of earning an hourly wage of \$59.08, which is well above the median living wage for the region of \$43.73.

Student interest and industry support in this effort are high, and the demand to generate a workforce in this area supports the establishment of this degree. Surveys conducted in the prerequisite class for the Biotechnology program (cell and molecular biology) show an extremely high interest in this proposed program (92% of the students expressed an interest in earning this Bachelor's degree). Faculty and staff at Solano College were surprised by this high number, but it corresponds to a comparable survey carried out at MiraCosta College where 91% of students indicated an interest.

## F. Evidence that each Eligibility Requirement will still be fulfilled, specifically related to the change

Solano College will continue to maintain compliance with all Eligibility Requirements when the College offers the proposed baccalaureate program and its component courses.

### 1. Authority

Solano College, located in Solano County, is one of 113 community colleges in California. Solano is authorized by the California Community Colleges Board of Governors to operate as an open-admission, public institution. As such, Solano College is authorized to provide workforce training, developmental courses, certificate and degree programs, and preparation for transfer to four-year institutions in accordance with the California Education Code. In addition, Solano College, in the Solano Community College District, is accredited by the Accrediting Commission of Community and Junior Colleges (ACCJC) of the Western Association of Schools and Colleges (WASC).

At the May 18, 2015 meeting, the Board of Governors of California Community Colleges voted unanimously to approve Solano College to offer a baccalaureate degree in Biomanufacturing ([Appendix T](#)). Upon ACCJC approval of this substantive change proposal, the Bachelor's Degree in Biomanufacturing will be added as a new program and as a stated component of the College's mission. Solano College's authority to operate will continue when it commences the offering of the baccalaureate degree.

### 2. Operational Status

Solano College has been in continuous operation since 1945 (originally as Vallejo Junior College) and operates in a manner that is consistent with its authority and mission. Enrolled students are actively pursuing courses, degrees and certificate programs offered by the College. In academic year 2014-2015, Solano College's student headcount exceeded 14,000 students, with 1356 degrees and 246 certificates awarded. The College offers its students a wide array of instructional programs and student services, a library collection and library services, and a wide selection of academic support services for both onsite and online students, as well as students enrolled in the Vacaville and Vallejo Centers. Student support services are available online, at the main campus in Fairfield, at the Vacaville Center, and close by at the Vallejo Center. The introduction and offering of the Biomanufacturing baccalaureate curriculum will add to Solano Community College District's diversity of degree and certificate programs.

### 3. Degrees

Solano College provides the courses needed to fulfill the requirements for 89 associate degrees and 39 certificates. The majority of the College's 962 course offerings apply toward degree or certificate completion and more than 69% percent of Solano students declare transfer or associate degree completion as their primary educational goal.



Solano College's School of Mathematics and Science currently offers an Associate Degree in Industrial Biotechnology. The proposed baccalaureate degree in Biomanufacturing will build on the existing curriculum and provide students with Solano's first undergraduate degree option.

#### 4. Chief Executive Officer

The Superintendent/President, Dr. Celia Esposito-Noy, is the Chief Executive Officer (CEO) of Solano Community College. The CEO is hired and appointed to her role by the District's governing Board of Trustees, and Dr. Esposito-Noy serves as the Secretary to the Board. The Superintendent/President is responsible for administering Governing Board policies, ensuring the quality of the institution, providing leadership in budgeting, managing resources, and assessing institutional effectiveness. The Superintendent/President also ensures that the institution adheres to all applicable laws, regulations, and policies. The Governing Board delegates the oversight of all programs and support services to the CEO, the Superintendent/President via Board Policy 1075 ([Appendix U](#)). As CEO with Board-delegated authority, Dr. Esposito-Noy will ultimately oversee the baccalaureate degree program in Biomanufacturing.

#### 5. Financial Accountability

The Solano Community College District (SCCD) adheres to Board approved policies and procedures regarding fiscal matters and annually undergoes and publicizes an external independent, financial audit of all federal, state, and local funds. The report is widely presented to all oversight bodies including the California Community College's Chancellor's Office, the SCCD Audit Sub-Committee of the Board of Trustees and the Citizen's Bond Oversight Committee. The final audit report is reviewed and accepted by the SCCD Governing Board in public sessions and for FY 2014-2015 ([Appendix V](#)). As in years past, the District received unmodified audit opinions.

Solano complies with all federal requirements to awards financial aid and meets the Eligibility Requirement of financial accountability through a Board-adopted and balanced budget that supports its educational programs.

#### 6. Mission

The mission statement of Solano College prescribes the College's institutional goals and provides the foundational philosophy underpinning the College's programs and services. The mission statement guides the planning process [Solano College Strategic Plan](#) for the College including program review, and program review serves as a guide to decisions about resource allocation.

Solano evaluates its mission statement as part of its accreditation cycle process or as needed in accordance with its strategic plan and educational priorities. The current Mission Statement, revised in 2016, reflects the diverse student population the College serves, as well as the College's commitment to student learning. Basic skills, workforce development, and a transfer level curriculum are the foundations of Solano Community College District's mission. The College publicizes its Mission Statement through a variety of venues, including its Web site

[Solano College Home Page](#) , the College Catalog ([Solano College Catalog](#)), College newsletters, wall displays, and in other official publications.

The baccalaureate degree in Biomanufacturing fits within the spirit and intent of Solano’s mission as described previously in this document. To clearly convey the College’s mission including the proposed baccalaureate degree program, the mission statement was revised from the mission statement last revised in 2012 to reflect the new goal of providing quality upper division courses leading to a baccalaureate degree, with replacement of the phrase “transfer level” with the word “undergraduate.” This revision was approved by the Academic Senate at its January 25, 2016 meeting ([Appendix C.1.](#)) and approval granted by the College Governance Council at its Feb. 10, 2016 meeting. Final approval of the revised mission by the SCCD Board of Trustees occurred at its June 15, 2016 regular meeting. At their regular meeting on August 17, 2016, the Board also approved the program itself to go forward ([Appendix W](#) and [Appendix W.1.](#)). The program fits within the mission of the college.

## 7. Governing Board

The Solano Community College District Board of Trustees is an eight-member body that includes a Student Trustee. The Governing Board formulates policy, maintains academic quality and institutional integrity, guarantees fiscal soundness, and ensures the fulfillment of the College’s mission as defined in Board Policy. Board members have discussed and have approved Solano College’s intent to offer a baccalaureate degree in Biomanufacturing as evidenced earlier in this document.

The Governing Board is of sufficient size and composition to fulfill all board responsibilities. Seven members are elected by the electorate within the District. Board members are elected to 4-year, staggered terms. The Associated Students of Solano College elect a Student Trustee annually to represent the Student Body for a one-year term.

The Board is an independent policy-making body and reflects constituent and public interest in its decisions and activities. Board members adhere to a conflict of interest policy ([Appendix X](#)) and the proposed baccalaureate degree in Biomanufacturing will not change Solano’s compliance with the Governing Board Eligibility Requirement.

## 8. Administrative Capacity

Solano College has a sufficient administrative staff with the appropriate experience to assure that the administrative duties (educational, technological, physical, operational) required to carry out the mission of the College are fulfilled. Solano administrators are hired through an open and competitive selection process and are regularly evaluated in accordance with Board and College policies. The rigor of administrative oversight at Solano Community College is sufficient to ensure effective leadership and efficient management of the College, provide program and services continuity, and maintain compliance with all laws, regulations, and mandates.

Staff and faculty members are appropriately prepared and fully qualified, meeting or exceeding minimum qualifications required for their positions. The Superintendent/President is supported by a Vice President of Academic Affairs, a Vice President of Finance and Administration, and a

Vice President of Student Services. In addition, as reflected in the SCC Organizational Chart ([Appendix M](#)), Solano Community College has a Chief Technology Officer; a Dean of Research, Planning, and Institutional Effectiveness; five Academic Deans, Center Deans, a Dean of Counseling, Associate Deans, Directors and/or Managers, a Chief of Campus Law Enforcement (Solano County Sheriff), and Confidential Employees who comprise the College's Administrative Leadership Group. The Biomanufacturing baccalaureate is directly supervised by the Dean of Mathematics and Science, who reports to the Vice President of Academic Affairs. The Dean of Mathematics and Science assigns the appropriate faculty to classes based on their preparation and experience.

Solano Community College's administrative capacity is sufficient in size, composition and academic preparation and experience to support the proposed Biomanufacturing baccalaureate program.

## 9. Educational Programs

Solano Community College's degree programs are congruent with its mission to provide basic skills, workforce preparation, and a transfer curriculum. The proposed bachelor's degree program in Biomanufacturing (undergraduate curriculum) will be added to the College's diverse array of educational opportunities that students need to achieve their career and life goals.

College programs are based on recognized fields of study, reflect a wide variety of disciplines, and are evaluated for rigor and quality through program review and outcomes assessment. The Solano Community College catalog ([Catalog Link](#) <http://www.solano.edu/catalog/catalog201617.php>) provides a description of educational degree/certificate programs offered by the College, incorporates course and unit requirements, and notes transfer applicability and career opportunities. The proposed baccalaureate degree in Biomanufacturing and its detailed description will be similarly included in the College catalog, once it has received formal approval. All programs and courses culminate in predetermined, identified student outcomes including skill mastery, learning competencies, career certificates and degree awards.

Degree programs are typically designed with two years of full-time academic study, with certificate programs ranging from short duration (single semester) to longer term work (up to four semesters). Educational programs have been approved by the California Community College Chancellor's Office. Solano's proposed bachelor's degree in Biomanufacturing has been authorized by the California Community Colleges Board of Governors ([Appendix J](#)) and will include four years of full-time study (lower and upper division coursework). The new baccalaureate program will have identified student and program learning outcomes as defined through the College's curriculum development process.

All new courses and programs are reviewed through faculty-led curriculum development process and approved by the Governing Board. All courses in the proposed baccalaureate in Biomanufacturing program will go through this rigorous and robust review process. The addition of the bachelor's degree in Biomanufacturing extends Solano Community College's educational offerings and provides a new and attractive opportunity for students, particularly those in the Industrial Biotechnology associate degree program.

## 10. Academic Credit

Solano College awards academic credit for coursework based on standards established in Title 5 of the California Code of Regulations, including the relationship between units awarded and lecture/laboratory contact hours, and generally accepted practices for degree granting institutions of higher education ([Appendix Y](#)).

Solano's definition of credit hour is consistent with federal and state regulations for community colleges and the Biomanufacturing baccalaureate program will award academic credit for all coursework in conformance with SCC's criteria for standards of credit.

The College provides information to students and the public about the awarding of academic credit in its College Catalog, on its website, in faculty resource guides and in student planners.

## 11. Student Learning and Student Achievement

Solano College continues to strive toward high standards in learning outcomes assessment and evaluation in order to provide quality student learning. The proposed baccalaureate program in Biomanufacturing will be established and assessed in accordance with Solano College practices and requirements for course, program, general education, and institutional level student learning outcomes.

At Solano College, all courses have approved course outlines of record and are required to have student learning outcomes, methods of assessment of those outcomes, and an ongoing, systematic cycle of assessment. To ensure and maintain the quality of programs and services, Student Learning Outcomes (SLOs) have been developed for 100% of all active courses and, of those, 95% percent have been assessed. 100% of College Programs have defined learning outcomes. Approximately 50% of the College Programs have been assessed. A formal review of these assessments by faculty occurs during Program Review every five years for transfer programs, and every two years for CTE programs.

Solano College's Assessment Committee, a subcommittee of the Academic Senate, regularly reviews assessment tools in use at the College. Institutional Learning Outcomes (ILOs) were assessed in Fall 2013 and modified in Spring 2016, and will continue to be assessed for currency and accuracy. Both Institutional Learning Outcomes (ILOs) and General Education Learning Outcomes (GELOs) were approved by the Board of Trustees at their January 20, 2016 meeting ([Appendix Z](#)).

All Biomanufacturing courses have SLOs developed and these will be regularly analyzed by the Curriculum Committee as part of the curriculum review process. These courses will be assessed during the first semester that they are taught and then on a regular, systematic cycle to ensure students who complete them are achieving the identified outcomes. Similar to other Solano College programs, expected learning outcomes for the proposed biomanufacturing baccalaureate program will be published in appropriate documents and online. In addition, the Biomanufacturing course SLOs will be incorporated into the Solano College SLO database, as are other SLOs and assessments.

## 12. General Education

In accordance with applicable education law, accreditation standards, and Solano CCD policy, students seeking an associate degree from the College are required to take General Education (GE) courses in order to promote intellectual inquiry and gain a breadth of knowledge across a wide range of disciplines.

Solano College courses designated for General Education reflect the high quality of the learning experience in rigor, scope, breadth and relevancy. Fulfillment of GE requirements assist students in achieving specific learning outcomes including the following basic educational abilities and skills:

1. *Communication*: Essential communication skills of speaking, writing, reading, and listening.
2. *Cultural and Societal Awareness*: Understanding the heritage and culture of one's own society and of others.
3. *Life and Career Skills*: Knowledge and opportunities in gaining information to aid in making realistic career/life decisions.
4. *Analytical Thinking*: Competence in mathematics and analytical thinking
5. *Global Citizenship*: Knowledge and understanding of the rights, responsibilities and privileges involved in becoming a participating citizen in a diverse world.
6. *Technology Literacy*: Understanding of technological developments and their effects.

Students have three options for the completion of the College's General Education requirement. Option A is a 21-unit pattern of courses representing Natural Sciences, Social and Behavioral Sciences, Humanities, Language and Rationality, and Cross-Cultural Studies. The College has an additional local requirement in the area of Health and Physical Education. Option B is a pattern of classes matching the Intersegmental General Education Transfer Curriculum (IGETC standards), and Option C matches the California State University GE standards. To graduate using either Options B or C, a student must also fulfill the local cross-cultural course requirement. All courses qualified to fulfill a General Education requirement are reviewed regularly during the curriculum review process to assure that they have the appropriate currency, rigor, breadth, relevancy, and a critical thinking component. Students who enroll in the baccalaureate degree program in Biomanufacturing will be required to fulfill either the IGETC or the 39-unit CSU requirement. In addition, the students will be required to complete 9 units of upper division General Education that will incorporate related scientific concepts into Solano College's GE learning outcomes.

## 13. Academic Freedom

The Solano Community College District adopted Board Policy 6430 ([Appendix AA](#)) regarding academic freedom in December 1984 and made revisions to this policy in 2007 and again in 2009. This Academic Freedom policy is featured on the College webpage and is published in the College Catalog, assuring that students and faculty are free to study, research, express themselves, and teach to their interests. Article 16.8 of the Solano College Faculty Association (Faculty Union) Collective Bargaining Agreement also addresses academic freedom.

Solano Community College maintains an atmosphere in which intellectual freedom and independence exist for all faculty and students. The Biomanufacturing bachelor's degree program and its faculty and students will engage in an inquiry-rich, academic-freedom environment and will access knowledge and gain experience through free and open discussions within their field.

#### 14. Faculty

Solano College has a sufficient cadre of qualified and experienced faculty to achieve its mission and to support its educational programs. The College employs 152 full-time faculty and approximately 280 adjunct faculty. Full-time faculty teach approximately 62% percent of the College's credit hours. All faculty possess the minimum qualifications of their teaching or academic positions as set forth by the California Community Colleges Chancellor's Office.

Faculty members at Solano College are responsible for academic and professional matters including teaching, counseling, identification of library resources, establishing pre- and co-requisites and degree and certificate requirements, curriculum development and review, grading and assessment of student learning, program review, professional development, and involvement in institutional planning and budgeting, accreditation processes and college governance structures related to faculty roles.

Program faculty develop courses and design coherent program sequences to provide a comprehensive learning experience for students. Faculty also develop and assess student learning outcomes, using multiple measures and evaluation techniques and tools. Solano College intends to hire a new full time faculty to teach in the Biomanufacturing program to ensure students receive courses of the appropriate quality and rigor. The new faculty member will have educational credentials that meet or exceed the minimum qualifications and will possess the appropriate academic background and industry experience for teaching in the subject area. This new faculty member will work with current Solano College faculty to develop and revise the baccalaureate Biomanufacturing curriculum and assess student outcomes for the purposes of ongoing improvement of the program and enhanced student achievement. With the new faculty member, the complement of faculty will be substantial and of appropriate size and composition to support the Biomanufacturing baccalaureate program.

#### 15. Student Support Services

Solano Community College's Fairfield campus, along with the Vacaville and Vallejo Centers, provides a comprehensive array of student services to assist students in meeting their educational goals. Support services reflect the values stated in the Mission Statement of the College and foster student learning and the attainment of skills, certificates and degrees.

Solano College has many student support services departments including Counseling, Academic Success and Tutoring, Admissions and Records, Financial Aid, Transfer Center, Career Center, Assessment Center, DSPS, EOPS, Veteran's Affairs, CARE, and CalWORKs. The College's Student Services faculty and staff conduct regular reviews of types of services and utilization, and also assess program and service area outcomes.

Students are oriented to avail themselves of various student services and these services are widely publicized in the College Catalog, College Class Schedule, College web site, and other official College publications. Faculty and student services staff provide information on accessible, supportive resources during classes, office hours, information desks, orientations and special student-oriented events. Students enrolled in the proposed baccalaureate program will have access to comprehensive and supportive services to meet their needs and assist them in achieving their degree goal. With the location of the Biomanufacturing program in the Vacaville Center, students will be able to conveniently receive assistance and encouraged to take full advantage of SCC's onsite and online student support services.

## 16. Admissions

Solano College's open admissions policy is consistent with its College Mission, the Mission of the California Community Colleges system, and the California Education Code of Regulations Requirement (Title 5) for open enrollment and participation. Solano College's admissions policy, clearly displayed on the College website, specifies the qualifications necessary to apply and be admitted to SCC.

A statewide discussion, led by the California Community College Chancellor's Office, on how to address the issue of admission into the fifteen pilot Bachelor's degree programs is ongoing and includes representatives from the institutions that will be granting a Bachelor's degree. A handbook outlining the statewide approach to admissions was recently released by the Chancellor's Office, using a modified version of the admissions process and worksheet for the Nursing program to meet the Biomanufacturing program needs ([Appendix BB](#) and [BB.1](#)).

Admissions into the Bachelor's in Biomanufacturing will follow the guidelines developed at the state level for admissions into a baccalaureate program. Recent state level discussions regarding equity and diversity in student admissions to the baccalaureate pilot programs prompted Solano College to review current student enrollments in the Industrial Biotechnology program. Analysis of the data indicate an underrepresentation of Hispanic and Black, non-Hispanic students. The College and the Biotechnology faculty have proposed specific recruitment efforts to address this issue, including Solano College Outreach in Research and Education (SCORE) and Bridge to Biosciences (B2B). It is anticipated these efforts will add to the pipeline of prospective students for the Biomanufacturing Bachelor's degree. The Solano College Biomanufacturing Pathways is shown on the following page.





# Solano College Biomanufacturing Pathways

**SCORE**

(Solano College Outreach and Research and Education)

## Potential AS and Baccalaureate Students

Articulated High Schools  
with Biotechnology  
Programs

Bridge to Biosciences

Solano College Science  
Students

Solano College AS  
Industrial Biotechnology

Graduates of intensive  
bootcamps (IBIS)

Incumbent  
biomanufacturing workers  
seeking a four year  
degree

Other Community  
Colleges with AS  
programs in  
Biotechnology (CCSF,  
Ohlone, Laney, and  
Contra Costa)

**Solano College Baccalaureate Degree in Biomanufacturing**

In the SCORE pathway, an outreach program (SCORE, or Solano College Outreach in Research and Education) recruits students into a high school articulated program (that might have a dual enrollment element) which feeds into the Solano College Industrial Biotechnology Associate degree which feeds into the Solano College Baccalaureate Degree in Biomanufacturing. There are other possible entry points, but the system represents a well-defined career pathway.

Solano College's Admissions and Records Office will also work with other baccalaureate degree granting colleges to provide information and, as the Chancellor's Office develops or requires these, supplemental information and application materials in addition to CCC-Apply for admission.

## 17. Information and Learning Support Services

Solano Community College is committed to providing information and learning support services for all students. A significant cadre of faculty and staff provide technology, library and learning resources, and academic support to students who are enrolled in SCC programs.

The College's Technology Services and Support department is responsible for the district-wide administration of technology including installation, upgrades, security, and user-support. The Technology Services and Support staff help Solano Community College students, faculty and staff communicate, retrieve, and utilize information. They handle the planning, operation and maintenance of the SCCD's technology infrastructure, administrative computing facilities, academic computer labs, smart classrooms, helpdesk, technology training, and the district-wide telephone system. These technology resources will be available to the faculty, staff and students in the Biomanufacturing program.

Similarly, the Solano College Library supports the students, faculty and staff across the SCC district with an extensive collection of library resources. Solano College students have access to the primary Library at the main campus, which includes a repository of books, periodicals, and electronic databases, as well as the recently expanded Library Services at the Vacaville and Vallejo Centers. The library on the Fairfield campus has an especially rich collection of titles in biomanufacturing, biotechnology, cell biology, molecular biology, and immunology. The College plans to enhance its library collection of titles related to biomanufacturing ([Appendix CC](#)) and house the majority of the new resources at the Vacaville Center where the Biomanufacturing program will be located. Additional library and learning resources have been identified, and new resources will continue to be identified through the College's normal curriculum development and review process where faculty can complete a Resource Request Form for specific titles and materials.

Academic support services include resources such as the Academic Success and Tutoring Center, the Math Activities Lab, the Reading and Writing Labs, Science labs, Student Computer labs, the Mathematics, Engineering, and the Science Achievement (MESA) Center. Biomanufacturing students will be able utilize these learning support services at Solano College and at the College's Vacaville Center, where students have ready access to a variety of student learning services, as well as services provided online.

Solano College will continue to meet its commitment as well as the Eligibility Requirement for Information and Learning Support Services for all its students including those enrolled in the Biomanufacturing baccalaureate program.

## 18. Financial Resources

Solano Community College District has sufficient financial resources and documents its funding base, financial resources, and plans for financial development are adequate to support student learning programs and services and improve institutional effectiveness. While most of the financial resources of Solano College comes from the State of California, additional funding is obtained from federal, state and private sources. The College, through Board oversight, maintains adequate reserve levels for contingencies and maintains financial management policies and practices that ensure ongoing fiscal stability.

Using a shared governance model, the Vice President of Finance and Accounting works closely with the College Governance Council and the Budget and Finance Committee to advise the college community about the budget and to receive input on budgetary matters. The Superintendent/President and the Vice President of Finance and Accounting submit annual budgets and updated budget reports to the governing board for adoption and review as appropriate and in a timely manner. The District's FY 2015-16 anticipated budget close-out reflects estimated reserves of 16% of its unrestricted expenditure and transfer requirements, which is in excess of the 5% minimum established by SCC Board policy and required by the California Community College's Chancellor's Office. These excess reserves provide financial stability and position the District for state budget shortfalls, minimizing the need to borrow and permitting a thoughtful budget reduction planning process if needed. Additionally, funds have been transferred to an irrevocable trust to pay for the costs of medical, dental and vision insurance benefits to eligible retirees.

Solano College has planned for the development of the proposed new baccalaureate degree in Biomanufacturing and has identified the funds needed to support the program's faculty, staff, facilities, equipment, and materials. These financial resources combined with the additional tuition fees for the proposed undergraduate degree coursework will be sufficient to sustain a high quality program and ensure Solano College's compliance with this Eligibility Requirement.

## 19. Institutional Planning and Evaluation

Solano College is engaged in the ongoing development and implementation of effective institutional planning, and provides institutional support to the Office of Institutional Research, Planning, and Effectiveness to support the College's systematic planning and assessment of outcomes to ensure student achievement and organizational improvements.

The College's Mission, Educational Master Plan, Facilities Master Plan, the Strategic Plan, Institutional Learning Outcomes, and Program Reviews connect and integrate planning initiatives across the institution and provide an integrated, iterative process for linking the plans to resource allocations directly aligned with district and college goals. Solano College regularly evaluates its planning processes through its shared governance bodies and student and institutional data is

collected, assessed and disseminated to ensure the College's strategic goals and its students' educational needs are being met. The College makes public (via the Solano College website) its various goals, planning documents, and assessment data.

Solano's systematic institutional planning and evaluation processes drive the College's decision making and corresponding resource allocations and will be utilized for Biomanufacturing program planning, assessment of program effectiveness, and identification of resource needs.

## 20. Integrity in Communication with the Public

The Solano Community College District Catalog contains pertinent information to assist students and to provide the public with accurate and current information about Solano College. It is available in print and on the College website. The catalog provides general information and contact information for the institution, the educational mission, accreditation status and accreditor entities, educational offerings, academic calendar, a statement on academic freedom, information on requirements for admissions, student fees, and other financial obligations, degree and certificate information, graduation, and transfer, names and degrees of administrators and faculty, names of Governing Board members, as well as information on major policies affecting students, to include academic regulations, nondiscrimination, acceptance of transfer credits, grievance and complaint procedures, sexual harassment, and refund of fees. The catalog is reviewed annually for accuracy and currency and includes publications and/or locations where additional policies may be found.

The 2017-2018 catalog will include information on the baccalaureate program in Biomanufacturing and student services related to the Bachelor's degree program. As well, this edition of the catalog (or the earlier mid-year addendum, if courses are approved at the state level by the publication date) will include course descriptions and requirements for the Bachelor's program.

## 21. Integrity in Relations with the Accrediting Commission

Solano College adheres to the Eligibility Requirements, Accreditation Standards, and policies set forth by the Accrediting Commission for Community and Junior Colleges (ACCJC). Furthermore, the College agrees to disclose information required by ACCJC and communicate any changes in its accredited status. The current accreditation status of the College and all correspondence with the ACCJC regarding accreditation is prominently displayed on the Solano College webpage ([Solano College Accreditation](#)). Solano College is in compliance with Commission requests, directives, decisions and policies and all of its disclosures are complete, accurate, and honest. Submitting and reporting the Automotive Technology Substantive Change request to the Commission was the College's most recent communication prior to this proposal.

A signed letter from the Superintendent/President assuring the District's compliance with the Commission's Eligibility Requirements, Accreditation Standards, and policies is on file with the

Commission and in the College Superintendent/President's office. Relations with the Commission will not be impacted as a result of this substantive change.

## **G. Evidence that each Accreditation Standard will still be fulfilled specifically related to the change and that all relevant Commission policies are addressed**

### **Standard I: Mission, Academic Quality, Institutional Effectiveness, and Integrity**

#### **Standard I.A. Mission**

*Solano Community College's mission is to educate a culturally and academically diverse student population drawn from our local communities and beyond. We are committed to student learning and achievement and to helping our students achieve their educational, professional, and personal goals. Solano transforms students' lives with undergraduate education, transfer courses, career-and-technical education, certificate programs, workforce development and training, basic-skills education, and lifelong-learning opportunities.*

The Solano College Mission Statement demonstrates the institutional commitment to student learning and helping students achieve their educational goals. The College publishes its mission to ensure its internal constituents and external communities comprehend its broad educational purpose, student population, academic programs, and standards for operation. In addition, this statement establishes the College's institutional goals and the college's plans for action to achieve strategic priorities. The College's governance groups and its shared governance processes provide the infrastructure for the institution's dialog and assessment of its academic quality administrative effectiveness, decision making and resource allocations. From these planning discussions and data assessment, the College also identifies new or updated student learning needs and opportunities that will improve its efficacy and advance the attainment of its mission. Current Solano College programs and services are aligned with its mission and any new programs and services must demonstrate they meet student educational and community needs.

The development of the proposed Bachelor's degree in Biomanufacturing and the construction of the Biotechnology/Science building at the Vacaville Center will help fulfill Solano College's mission. These programmatic and facility commitments reflect the College's ongoing pledge to change students' lives and to help them develop the workforce knowledge and skills that they need to enter this high-demand, high-growth, high-wage field that provides opportunities for upward mobility. While the SCCD fulfills its mission and pursues its vision to transform students' lives, these visible and tangible actions provide the foundation for those graduates to help transform the lives of their families and positively impact their communities.

Solano College's Mission Statement has been updated to reflect this new mission of providing upper division courses leading to a baccalaureate degree. The phrase "transfer level" currently within the stated mission has been revised to read "undergraduate." This change was approved by the Academic Senate, the College Governance Council, and by the Biomanufacturing Bachelor's Degree Implementation Advisory Committee. The College will continue to review the mission for currency and accuracy during its regular planning cycles.

## **Standard I.B. Assuring Academic Quality and Institutional Effectiveness**

### **Academic Quality – Standards I.B.1-4**

Solano College assures its academic quality and overall institutional effectiveness through its ongoing and collegial dialog concerning student learning and achievement. The College collects, evaluates, and broadly discusses student outcomes data and organizational performance benchmarks to inform planning and program review processes and to identify opportunities for institutional and student achievement improvements. Sustained discussion occurs in governance groups and college committees, with evidence of student learning and success provided as the basis for objective evaluation and indicators of possible programmatic and services enhancements to support emerging needs and enhanced outcomes.

Solano College defines and assesses student learning outcomes for all educational programs and service areas. As an example, the College's current Biotechnology program (associate degree) has well-established SLOs and faculty members are conducting a data-informed program review this academic year and will review the program again in the 2019-2020 academic year. In accordance with college educational standards, the proposed Biomanufacturing program and its courses have defined student learning outcomes appropriate for upper division courses. Utilizing Bloom's Taxonomy indicators reflecting higher level thinking, these identified outcomes will be assessed in Fall 2017, the first semester of the program's upper division offerings, and will continue to be assessed on a regular cycle throughout implementation and continued offering of the program.

The College has established standards for student achievement through its student, program, general education and institutional learning outcomes. Solano College also maintains appropriate academic credit policies and standards for the granting of student grades, credit hours and units, and certificate and degree awards. Student success data as reported both internally by the College's Office of Research and Planning and aggregated and accessed in the Solano College Student Success Scorecard are disseminated and utilized by constituencies (individual faculty, academic departments, campus committees) in planning and program review processes to determine how well the institution is achieving its mission.

Solano College demonstrates its effectiveness in its collection of evidence of student learning and success, using SLOs and other metrics to gauge how well learning and achievement are occurring, and making changes in a well-defined and coordinated continuous improvement process. In addition, Solano College participates in the Institutional Effectiveness Partnership Initiative (IEPI) efforts to improve academic quality, student success, and institutional effectiveness.

### **Institutional Effectiveness – Standards I.B.5-9**

Solano College regularly assesses the accomplishment of its mission through an integrated planning process and evaluation of student, program and organizational data. Institutional plans, including the District Strategic Plan, Educational Master Plan, Facilities Plan, and Technology Plan, as well as program plans use quantitative and qualitative benchmarks to establish short and

long term goals. Goals are established in a holistic fashion with the identification of human, fiscal, technological, and physical environment resource needs.

Metrics and evidence, such as SLO achievement, delivery modes, enrollments, and program type, are then collected for review and assessment, and where appropriate, disaggregated for analysis of effectiveness and identification of performance gaps (goal vs. actual) for students and for the College. Results of departmental and college wide discussion and evaluation are communicated broadly to ensure awareness and shared understanding of institutional progress and needed work and also published in college updates, program reviews, and posted on the College website. Strategies to address identified gaps are then researched, discussed for efficacy and feasibility, and implemented with appropriate College support and resources.

Instructional programs and student learning and support services, including related policies and practices, are regularly evaluated and lead to the College's improved effectiveness. Solano College established a goal in its Educational Master Plan to:

*“Strengthen existing workforce programs ... by regularly developing, evaluating and modifying curriculum and programs that foster workforce-ready and entrepreneurial graduates, and focusing on service area and regional clusters, industries and occupations that exhibit strong potential.”*

The proposed baccalaureate in Biomanufacturing program emerged from the College's planning process and goal setting and it will extend the academic quality of the existing Biotechnology program and assist Solano in meeting student and community needs. Leveraging the human, facility and fiscal resources of the College's current program to create an undergraduate degree option and new career opportunities for students represents the enactment and accomplishment of the College's mission.

### **Standard I.C. Institutional Integrity**

Solano College has committed itself to operate with integrity in all policies, actions, and communication with the public. SCCD demonstrates this commitment in its clarity and accuracy of information provided to students, prospective students, and other interested individuals and organizations concerning the College's mission, goals and outcomes, and accreditation status. The Solano College Catalog is updated by the Curriculum Office and published electronically every year, with an addendum published electronically at mid-year points, and serves as the most complete source of information about the College's courses and programs, degrees and certificates, academic credit, student support services, required fees, and major policies and procedures affecting students. All information included in the catalog is also available on the College website and is reviewed and revised annually to ensure accuracy. Pertinent information on the baccalaureate program in Biomanufacturing will be published in the Solano College Catalog and on the website to ensure prospective students understand admissions, course requirements, and expected learning outcomes.

Solano College administration, faculty, staff, and Governing Board members act honestly, ethically, and fairly in the performance of their duties. The College has formally adopted a Code of Ethics, developed by a Code of Ethics committee, which drafted the current Code in 2012, and then brought the document for approval through every stage of the shared governance process



and ultimately for approval by the Board of Trustees. This code, shown below, was updated and approved through the same processes in 2016 and was approved by the Board of Trustees at their February 17, 2016 meeting.

#### POLICY 4100: The Code of Ethics

The Code of Ethics serves to articulate values that the college embodies and promotes:

- Act with uncompromising integrity, dignity, respect, and fairness, and promote a spirit of collegiality campus-wide.
- Recognize and work to meet the college's responsibility to all citizens of the District to provide an educational program of the highest quality.
- Maintain and support transparency, communication, and equity in governance of the College, and in relationship to the community.
- Commit to the advancement and protection of academic freedom for all members of the institution.

This Code of Ethics is displayed on the District website and prominently displayed in the Solano College Catalog, directly below the Mission and Vision Statements of the College and next to the Core Values.

Solano College's commitment to the free pursuit and dissemination of knowledge and support of intellectual freedom are codified in its Academic Freedom statement ([Academic Freedom Policy](#)). The College's policies and expectations for honesty and integrity are also codified in the Solano College statement on Academic Integrity and the Honor Code shown below.

#### ACADEMIC INTEGRITY

*At the heart of any institution of higher learning is the fundamental right of Academic Freedom for which Honesty and Integrity are preconditions. Academic Integrity is therefore fundamental to the Solano Community College community. Academic Integrity is maintained only when all academic work is the product of identified individuals.*

*Any act of Academic Dishonesty interferes with Academic Integrity and therefore with the core values of this institution. All violations of Academic Integrity on the part of any member of the academic community constitute a serious offense.*

#### SOLANO COLLEGE HONOR CODE

*At Solano Community College, we believe that Academic Integrity is fundamental in an institution dedicated to personal development through learning, free inquiry, and the exchange of ideas. Honest work is an integral part of the learning process: it builds self-esteem, knowledge, and skills. It is the responsibility of every Solano Community College student to represent work truthfully and engage honestly in all assignments. We believe that any instance of academic dishonesty hurts the entire college community.*

Solano College will continue to comply with its own provisions and with all Commission Eligibility Requirements, Accreditation Standards, reporting requirements as well as with those imposed by external agencies when the baccalaureate degree has been added.

## Standard II: Student Learning Programs and Support Services

### **Standard II.A. Instructional Programs**

Solano College is committed to offering academic opportunities in fields of study consistent with its mission and to providing the highest possible educational quality in all of its programs and courses. The design of each course and program relies on subject matter experts on the faculty and those serving on the industry advisory committee for that discipline. When possible, the courses and the program are aligned with competencies based on nationally recognized standards. All course or program additions, deletions, or modifications must be reviewed and approved in accordance with academic standards by the discipline faculty, the Dean of the School in which the program resides, the Curriculum Committee of the Academic Senate, the Vice President of Academic Affairs, and ultimately the Board of Trustees which includes the Superintendent/President.

Each course within the current associate degree and certificate programs underwent this multi-committee and rigorous process for approval. In addition, the certificate programs, to gain CTE certification, underwent an additional approval process through the Chancellor's Office. All course approvals (10 major area courses and three General Education courses) for the Bachelor's in Biomanufacturing have undergone this same intense and academic quality-focused review.

The Curriculum Committee plays a critical role in approving all course outlines, student learning outcomes, and in approval of the overall program. All members of the Curriculum Committee have been trained in how to apply the regulations from the California Code of Regulations (Title 5), the California Education Code, and the Commission Standards to assure the compliance and overall integrity of every program including this one ([Solano College Curriculum Handbook](#)). Breadth, depth, sequencing, delivery mode and rigor are evaluated by the committee during its review process. The Curriculum Committee is also well-versed in the College's policies and procedures. Under the direction of the Academic Senate, and with the guidance of the Bachelor's Degree Advisory Committee, the Curriculum Committee agreed to set aside meetings, or add extra meeting time, during the latter half of the prior semester to review courses for the Bachelor's degree. New courses have been submitted to the Chancellor's Office for approval and initial offering in the Fall 2017 semester and scheduled in a manner that will promote timely program completion by enrolled students.

Program faculty will depend upon the expertise of the Biotechnology Advisory Committee during the design and subsequent review of the program after it launches. The faculty will depend upon rigorous assessment of the program's outcomes to ensure that the quality of the curriculum will continue to meet industry standards. Student Learning Outcomes are embedded within the culture of the college. These outcomes will be assessed every semester and the results of these assessments will be used to refine the curriculum. SLOs and their assessment are linked to planning, resource allocation, and are used for continuous quality improvement. All of these activities are analytically linked during the Program Review Process that will occur every two years. The College's Program Review Handbook has been updated to include relevant sections

and references to the baccalaureate program in Biomanufacturing ([Solano College Program Review Handbook](#)). By following established processes and procedures, the Bachelor's degree in Biomanufacturing can be refined and improved under a continuous improvement strategy.

## **Standard II.B. Library and Learning Support Services**

Solano College supports student learning and achievement by providing library and student support services of sufficient quality, depth and variety to meet student needs and foster the achievement of their educational goals. The College's resources in support of student learning regardless of location or delivery mode, include libraries, book and materials collections, tutoring and academic success centers, computer labs and learning technology in classrooms and campus study settings. Solano relies on the expertise of faculty and support services personnel to identify and regularly evaluate educational materials and equipment that support student achievement. Any proposal for a new course or a new program, including the proposed baccalaureate program in Biomanufacturing, is reviewed for sufficient library resources and sufficient learning support services as an integral part of the curriculum review process.

### **Library**

The Solano College Library on the main campus offers book collections and online databases and the full-time Library Services available at the Vallejo and Vacaville Centers provide instructional support to all students. As detailed in Section J, the Solano College Biotechnology faculty have worked closely with the library staff for decades to assure that the book and journal offerings in this field are robust and remain up-to-date. The faculty submit book requests and the majority of books and related resource materials are ultimately ordered and catalogued for students' access and use. Library databases currently include at least 725 books and 256 journals (via subscription) covering cell and molecular biology, immunology, biotechnology, and biomanufacturing.

The Library's Biotechnology and Biomanufacturing resources is being expanded to include additional current resources that specifically support upper-division Biotechnology courses and the program's General Education upper division courses. These resources will continue to be identified and updated during delivery of the program.

### **Learning Support Services**

Solano College provides quality and accessible tutoring and learning support students to all students and encourages utilization of these support services by every student who wants or needs them. Tutoring is available for students to support student progress and success in current courses. The College operates an Academic Success and Tutoring Center (ASTC) to provide easy access for students to resources they may need. The ASTC is open to all Solano College students, faculty, and staff and serves as a center to encourage and facilitate academic success through support services that include computer usage and free printing, a supportive and positive study environment, academic success workshops (e.g., test anxiety strategies, study skills, exam preparation, research and writing papers), information about important campus support resources, whiteboard use, drop-in tutoring for a variety of subjects, as well as providing a place for instructors to meet with students or conduct office hours. Faculty members serve as directors and primary staff of the ASTC, along with classified staff and student tutors. The current director of

the ASTC anticipates that some new tutors will be needed to support specific lower-division and upper-division courses. Recruitment of appropriately qualified tutors for these courses will occur both internally and through outreach to partner Biotech companies and local universities.

## **Standard II.C Student Support Services**

The Counseling Department and other Student Services departments (e.g., Veterans' Services and Financial Aid) have been closely involved in the initial planning of this Biomanufacturing program and are prepared to assist students to enroll and complete the baccalaureate program. Counselors are trained and available to help orient students to program requirements and expectations and to assist students in developing a Student Educational Plan. During the implementation of the upper division component of the program, several counselors will be designated to provide support for students enrolled in the Biomanufacturing program.

The Career Center staff members have worked closely with the Biotechnology faculty for the existing program, and these staff members are prepared to assist students to write resumes and cover letters, to develop their interview skills, and to develop a career strategy. The Career Center currently engages in extensive outreach efforts with local industry partners and helps match students with available job opportunities. Counselors and Career Center staff are already seeing students who are interested in pursuing the Bachelor's degree in Biomanufacturing at Solano College.

The College also operates a Disabled Student Services Program that works with faculty to identify and to provide appropriate accommodations for students with disabilities. MESA and TRiO-STEM services are also available to students in the science disciplines.

Full Library and Learning Support Services to address the needs of students are available on the main campus and will be increased in Vacaville with the opening of the new Biotechnology/Science building. Primary student support services include admissions and registration assistance, counseling, library, tutoring, assessment, financial aid, computer labs, and reading and writing labs. All student services departments have developed clear service area outcomes (SAOs). These SAOs are assessed regularly and data is reviewed as an integral part of the College's planning and institutional effectiveness processes.

Solano College will ensure that baccalaureate students will have access to all of these student support services and additional services that specifically meet the individual needs of upper-division students. These needs are not expected to be very different from those services currently offered to students pursuing the Biotechnology certificates and associate degree. All student services departments have websites that provide students with information and appropriate forms, and many departments can provide services in an online format. These pages will be updated after program approval to include student services information that is relevant to baccalaureate students, including admissions requirements and policies, tuition and fees, and degree and graduation requirements.

## **Standard III: Resources**

### **Standard III.A. Human Resources**

Solano College assures the integrity and quality of its programs and services by employing qualified administrators, faculty and staff. The College has formal hiring processes based on the District's Hiring Policies, including its Equal Employment Opportunity policy to assure that the College employs qualified certificated and classified employees ([EEO Plan](#)). Position descriptions are aligned with the College's mission and include specific tasks for each position such as curriculum development and student learning assessment in faculty postings. The employment screening process includes a requirement that all candidates meet local and State of California minimum qualifications for their respective positions. Faculty and administrators meet minimum qualifications recommended by the Academic Senate for California Community Colleges and established by the California Community Colleges Board of Governors ([Minimum Qualifications 2014 link](#)). In addition, Solano College's Human Resources Office verifies that all degrees listed by candidates for certificated and classified positions have been earned from accredited institutions.

Solano College maintains a sufficient number of qualified faculty and staff to ensure that instructional and operational responsibilities essential to the College's mission and effective administration can be handled smoothly and in a competent manner. All classified and certificated staff and administrators at Solano College are evaluated on a regular basis. Faculty and staff members are evaluated based on established Board policies as negotiated through their collective bargaining agreement ([Appendix DD](#)). The College has adopted and published its Code of Ethics and professional development of faculty and staff is supported through the availability of on-campus and external programs.

The Human Resources Office implements the District's Equal Employment Opportunity Program and oversees adherence to federal and state regulations. The College's Staff Equity Committee is a standing committee that developed the Staff Equity Report and continues to advise the District on how to maintain policies and procedures that support reaching the College's equal opportunity goals.

Human resource planning has been integrated with institutional planning by having the analysis performed and the evidence gathered during the program review process to inform hiring priorities. The College committed to hiring an additional full time faculty member in the application to the Chancellor's Office to pilot the bachelor's degree in Biomanufacturing, as documented in the application submitted for the pilot program.

### **Standard III.B. Physical Resources**

Solano College assures safe and sufficient physical resources for its educational programs and services. Facilities are constructed and maintained to provide accessible, safe and healthy learning environments for students, faculty and staff. The College operates a main campus and two centers, located in the cities of Vallejo and Vacaville. Planning for building, maintenance, and operations of these campuses is codified in the long-range Facilities Master Plan with utilization and overall cost data reviewed regularly to sustain the College's high-quality physical plant.

The main campus in Fairfield lies on 192 acres and has 28 buildings with 348,615 assignable square foot capacity. Vallejo Center, situated on 10 acres, houses various academic programs in a 28,647 square foot building. The Vacaville center lies on 60 acres with a single 34,916 square

foot building. The College owns an additional 4.32-acre site across the street which houses the Vacaville Annex and this site has a single 16,500 square foot building. The College has begun construction on a 31,943 square foot Biotechnology/Science Building at the Vacaville Center location, with the building slated to be completed in Fall 2017. The new building will house a 4-lab Biotech suite consisting of: 1) a Cell Culture Lab; 2) Fermentation Lab (Bioreactors); 3) Protein Purification Lab; and 4) a Qualification Control/Assurance lab. The existing state-of-the-art lab on the Fairfield campus, added to the new Biotech lab suites in Vacaville, will ensure that the Biomanufacturing Baccalaureate program will have quality, state-of-the-art physical resources available for use (Appendices N, O, and P).

### **Standard III.C. Technology Resources**

The College's technology services and resources are adequate to support the teaching and management functions of the institution. Technology resources for the baccalaureate program in Biomanufacturing have been identified and will be sufficient to support a quality learning experience for enrolled students.

Solano College has made a concerted effort to provide appropriate and expanded funding for the technology needs of the campuses. Bond funds are being leveraged to advance the District's technology infrastructure, particularly within specific building projects. The Board of Trustees at its August 20, 2014 meeting also approved a \$14 million technology budget ([Solano College Bond Spending Plan](#)).

The College's Technology Plan is currently being revised, adopting a more strategic and longer-range planning approach. Early in the process, resources were used to fund the most immediate and critical needs for "updating" technology, which is now shifting to a "total cost of ownership" model, moving away from a crisis-response mode. A "refresh" program is in place, and new computers are systematically provided to newly hired faculty. Planning for other technology needs occurs through the department planning and program review processes. These planning processes, along with institutional priorities, now inform technology planning, further demonstrating the college's attention to a fully integrated planning and resource allocation system.

### **Standard III.D. Financial Resources**

The District has sufficient financial resources to support and sustain student learning programs, including the proposed baccalaureate program, and to improve institutional effectiveness. Solano College's mission and the Board of Trustees' goals create the foundation for financial planning. Financial planning is integrated with the College's overall planning processes and provides for the appropriate distribution of resources and continued financial stability. SCCD's history of solid management and fiscal leadership has culminated in an ending General Fund balance of 16% by the end of fiscal 2016. Thus SCCD's financial picture looks strong, and is able to support quality educational programs and services and meet student and organizational needs.

Looking forward, long-range financial priorities are folded into the annual budget development process utilizing both the Five-Year Capital Outlay Plan and Scheduled Maintenance Plan for facilities-related costs and the Technology Master Plan to address technology needs. Additionally, where possible and appropriate, long term obligations were paid off via the bond,

e.g., the qualified energy conservation bonds were used to build out the solar system installations at Fairfield Campus and the Vacaville and Vallejo Centers. The identified priorities were built into the bond language, which greatly alleviated operational costs.

SCCD's plan to address its unfunded retiree medical liability, is to annually contribute the difference between the "pay-as-you-go" cost and the annual required contribution (ARC), as determined in its bi-annual actuarial study (most recent dated, September 2013) to the California Community College League's retiree health fund Joint Powers Authority. The actuarial study is being updated and the district expects it to be completed in the coming months.

Budget assumptions, based on the Governor's Budget, are fiscally conservative and financial information is readily available to college constituents via the Banner system. Solano Community College District's multi-faceted budget planning and review process culminates in the proposed budget allocations, which undergoes a final review by the Executive Committee before being submitted to the Governing Board for approval.

Revenue and expense activities are examined annually by an independent audit firm, contracted to perform the district audit as well as two bond audits, a performance and financial audit. These audits are performed annually and results of the audit reports including the institutional responses to external audit findings are accepted in an open Governing Board session. For the last ten years, periods 2005-06 through 2014-15, the district audits, which include thorough reviews of internal controls and structure ended in clean (unqualified or unmodified) opinions, attesting to the integrity of the District's financial management practices. The annual audits are then posted on the Finance and Administration web site, where periodic financial statements; budgets and budget presentations; Measure G and Q bond audits; quarterly and annual budget and financial reports; and actuarial studies for the retiree health liability can also be found at [Solano College Finance and Administration](#).

## Standard IV: Leadership and Governance

Solano College recognizes and uses the contributions of leadership throughout the organization to promote student success, academic quality and integrity, and continued effectiveness of the institution.

### **Standard IV.A. Decision-Making Roles and Processes**

At Solano College, governance roles are identified and supported by the College's organization structure and decision-making processes. Solano College follows a shared governance model, a commitment to participatory governance. The governance infrastructure at Solano College, inclusive of all constituencies, is well-defined and will capably handle the new and added requirements and procedures needed to support and grant the bachelor's degree in Biomanufacturing program.

Governance structures and processes are regularly evaluated to ensure that faculty, staff, students and administrators have access to participate in college decision processes. In November 2015, the Shared Governance Council was renamed the College Governance Council, and the Budget and Finance Committee was formed. This change reflects how the governance structure is

evaluated periodically and serves as the foundation for proposed improvements based upon constituent feedback, reflection, and dialog.

The College Governance Council, chaired by the Superintendent/President, develops policy and procedural recommendations to present to constituents and to the Board of Trustees. Educational program development, degree requirements, and curriculum fall into the purview of the Academic Senate and Academic Affairs in a shared governance model.

The Academic Senate considered the pursuit of a Bachelor's degree and voted unanimously to proceed with the proposal at its regular meeting on November 17, 2014, as documented earlier in this proposal. The Senate's recommendations were tendered to the Academic Deans' Council and the President's Cabinet for further consideration, and the Superintendent/President submitted the change to the Board of Trustees for action. On December 19, 2014, the College formally submitted an application to become a part of the California Baccalaureate Degree pilot to the Chancellor's Office, representing the California Community Colleges Board of Governors.

The decision to primarily site the Biomanufacturing Program in Vacaville came about as a result of SCCD's institutional leadership encouraging Solano College faculty and administrators to search for an innovative solution to make the newly proposed Career and Technical Program accessible to more students. Relevant data and perspectives were shared and the decision to locate the program in the city of Vacaville was most desirable to all. The renovation of Room 114 in the Vacaville Center will allow early offerings at that location. Additionally, the faculty and administrators involved in this decision exercised a substantial voice in making key recommendations and decisions. The former Solano College Superintendent/President, the former Dean of Mathematics and Science, the full time faculty members, and the former Executive Bonds Manager together researched possible locations, assessed the viability and suitability of those locations, and worked collaboratively to make a sound recommendation about this location for the Biomanufacturing Program. As discussed earlier in this document, the Vacaville site is best suited to offer students access to industry partners, with potential internships and job opportunities.

The clarity of decision making roles with the resultant effectiveness of the decision to site the proposed baccalaureate degree in Vacaville is an example of the distributed leadership model that Solano College follows in its institutional processes and will serve students well in the development and implementation of the Biomanufacturing program.

#### **IV.B. Chief Executive Officer**

The Superintendent/President is the Chief Executive Officer (CEO) of the Solano Community College District. The CEO is hired by the District's Governing Board, and serves as the Secretary to the Board. The Superintendent/President is responsible for administering Governing Board policies, ensuring the overall quality of the Institution's services, providing leadership in budgeting, managing resources, and assessing institutional effectiveness. The Superintendent/President also ensures that the College adheres to all applicable laws, regulations, and policies.

Because Solano College is a single college district, the Superintendent/President has the sole full-time responsibility as Chief Executive Officer with the requisite authority and responsibility to



assure quality of instructional programs and student and administrative services provided to students and the College community.

The previous Superintendent/President supported and encouraged the development of the baccalaureate program at every stage, and he provided regular reports to the Board of Trustees and the community about the purpose and progress of the application to participate in the pilot baccalaureate program. The new current president, Dr. Celia Esposito-Noy, has likewise expressed strong support.

The Superintendent/President continues to consult with the Administrative Leadership Group, the Academic Senate, and the College Governance Council to assure the College has appropriate staff, faculty, facilities, and budget resources available to fully support the new program.

#### **IV.C. Governing Board**

The Solano Community College District Board of Trustees is an eight-member body that includes a Student Trustee. The Governing Board formulates policy, maintains institutional integrity, assures fiscal soundness, and ensures the fulfillment of the College's Mission. The seven elected members of the Board of Trustees are elected to four-year, staggered terms, and each represents and resides in a specific area of the Solano Community College District. The members are elected by the registered voters of the same trustee area. The Associated Students of Solano College elect a Student Trustee annually to represent the student body for a one-year term. The Student Trustee gives an advisory vote on all decisions.

The Solano College Board of Trustees hires and delegates power and authority to the Superintendent/President. The Board's other duties include establishing Board policies, approving long-range academic and facilities master plans, supervising the broad policies for construction of projects under the bond Measure Q, and establishing policies for and approving courses and educational programs. Board policies and procedures for District operations are published on the College website.

The Board of Trustees participates in an annual evaluation of its performance by measuring progress towards established board goals via a self-assessment and by soliciting College constituent feedback through a survey tool. The Board dedicates a special workshop each year to reflect on all components of its annual evaluation as it sets goals for the coming year. In addition, the Board of Trustees participates in professional development for ongoing improvement. The Board has an established code of ethics that it reviews annually for currency and relevancy. The Board has been informed and has supported the baccalaureate degree proposal at every stage.

## H. Evidence that the baccalaureate program meets the minimum requirements for the degree (120 semester units or equivalent)

The Biotechnology Department currently provides students with the opportunity to attain an Associate of Science in Industrial Biotechnology or an Associate of Science in Applied Biotechnology (both 60 units), which are comprised of major, general education, and elective courses. The associate degree will serve as the foundation for the proposed Bachelor of Science in Biomanufacturing. Students completing the associate degree can proceed to upper-division course work to complete the baccalaureate, contingent on a more formal “admission” process that is developed by college partners in the Bachelor’s degree pilot program, individual colleges themselves, and finalized by the Chancellor’s Office.

As detailed in Tables 1-4 (Pages 20-26) of this document and in Table 5 below, courses are designed to meet the minimum requirements for the degree. Full-time students who succeed in courses as they are scheduled can complete the degree with 120 units in four years.

**Table 5. Baccalaureate Program Requirements**

<b>Associate in Science, Biotech, Lower Division Coursework Unit Distribution, and Baccalaureate Coursework Unit Distribution</b>	
<b>Required Courses</b>	<b>Unit Distribution</b>
Lower Division Major Courses	22-24
General Education Courses	38
Subtotal major and GE	60-62
Subtract units that can be double-counted for major and GE	-10
Subtotal major and GE (adjusted)	50-52
Elective Courses	8-10
<b>Associate Coursework Subtotal:</b>	<b>60</b>
<b>Baccalaureate Coursework Unit Distribution</b>	
Upper Division Major Courses	39
Upper Division GE Courses	9
Elective Courses	12
<b>Baccalaureate Coursework Subtotal:</b>	<b>60</b>
<b>Baccalaureate Total:</b>	<b>120</b>

## I. Evidence that the baccalaureate program meets the minimum baccalaureate level General Education requirements

### 1. 36 Semester Units or Equivalent

Students completing the biomanufacturing degree will complete either the Intersegmental General Education Transfer Curriculum general education pattern or the California State University General Education pattern to complete 39 units of lower-division General Education (GE) courses. In addition, each student will complete 9 units of upper-division general education courses; this follows the upper division GE pattern of the CSU system. In each case the GE pattern exceeds the 36-unit standard. The rationale is that by using these statewide standards rather than a local GE pattern, students completing their lower division requirements at a different college will have a clear understanding of the lower division GE requirements for the biomanufacturing baccalaureate.

### 2. Distributed across the major areas for General Education (arts/humanities, natural science, mathematics, social science, and oral/written communication)

Consistent with Title 5 requirements and accreditation standards, the Solano College general education program provides students with the opportunity to develop a broad understanding of mathematics, science, social science, humanities, and the arts as well as effective oral and written communication skills.

Students complete courses in each of these general education categories, which allows them to experience the breadth of Solano's curriculum offerings, to explore the connections among various disciplines, and to investigate subjects different from their identified major. The intended result is engagement in intellectual discussion, enhanced skills to apply to major and upper-division course work, and preparation as productive citizens in a global environment.

### 3. Integrated throughout the curriculum (distributed to both lower and upper division courses)

The interdisciplinary lower-division and upper-division general education component of the Biomanufacturing degree will provide students with both introductory and specific subject areas that will focus on the development of the Solano College general education outcomes: effective communication, critical thinking, global awareness, information literacy, and productive work habits.

The upper-division general education curriculum integrates courses from other disciplines whose concerns overlap with Biomanufacturing. These courses will examine them in a contextualized way that makes it relevant, current, and integrative. Each of these courses will require background knowledge acquired in a lower division course and build upon that knowledge. An upper division technical writing course will extend the writing skills that students learned in English composition to the technical writing challenges that they will encounter in their field. A project management course will ensure that students can apply the processes, methods, knowledge, and skills to achieve program objectives. A Bioethics course taught in the philosophy department will build upon a previous philosophy course to examine the ethical challenges that the biotechnology field has and will continue to generate.

## J. Evidence that the library and learning resources are sufficient in quality, currency, variety, quantity, and depth to support the baccalaureate program

The Solano College Biotechnology faculty members have worked closely with the library staff for decades to ensure that the book and journal offerings in this field are robust and remain current. Faculty members submit book requests, and each requested book has almost always been ordered. Library databases have at least 725 books and 256 journals (subscription) covering cell and molecular biology, immunology, biotechnology, and biomanufacturing.

As a routine part of the course approval process, the Solano College library staff must check every new course proposal and confirm that the library can provide the appropriate materials and services to support the new curriculum. In the CurricUNET process used by Solano College to submit course proposals, the initiator of the new course must move down a list of steps, and the review of the course by the library staff is a mandatory step. The process cannot continue without a sign-off by the library. This assures that each course can receive sufficient support from the library. At the Curriculum Committee meetings, each course proposal is reviewed to ensure that materials and textbooks that are going to be used for that course have been identified. If textbooks or materials are more than five years old, the faculty member proposing the new course or revision must make arguments to convince the Curriculum Committee that the text is still relevant as a “classic.”

The main library has a reference desk that is staffed full time by professional librarians who can provide research support to all students. The library staff also provides customized instruction to meet the research needs of individual classes and departments upon the request of a faculty member. Additionally, the Library offers courses in research skills and the use of resources. One of these courses, Learning Resources 10, is linked to every English 1 (English composition) course, thus assuring that every Bachelor’s degree candidate will have early instruction in information competency and academic article retrieval.

As the Biomanufacturing faculty identify additional needs, the Library will incorporate the requests into the already existing procedures and processes to assure baccalaureate students have the resources they need to be successful. The Library’s biotechnology resources will be expanded to include additional resources that specifically support upper-division biotechnology courses and the courses of the General Education upper division courses. Many resources have been identified, as stated previously ([Appendix CC](#)) and the library is working with faculty to prioritize and purchase these resources. Additional resources will be identified as the baccalaureate program is implemented and the newly-designed upper division courses are offered and assessed for the first time.

## K. Evidence that faculty qualifications are rigorous and appropriate

### 1. Discipline expertise

All of the faculty have earned the appropriate academic credentials and also have industry experience.

Jim DeKloe, Professor of Biological Sciences and Biotechnology, serves as the director and founder of the Industrial Biotechnology program at Solano College. He has taught at Solano College since 1990 and has taught biotechnology since he designed the program in 1997. His A.B., M.A., and Candidate in Philosophy (passage of the Ph.D. oral qualifying exam plus specific courses) were all earned at the University of California, Los Angeles. On a sabbatical leave he worked in the manufacturing department of biotech pioneer Genentech Inc. where he learned the science and the regulatory compliance requirements of the manufacturing process. He also served as a consultant to help biotech giant Amgen redesign the training programs for their biomanufacturing technicians and for their quality assurance associates. In the past, he served as the regional director of the Southwest Region of Bio-Link, the nationwide consortium of community and technical colleges that teach biotech. He currently serves on the advisory committee for the Explorer Education Division of BioRad, and on the advisory committees of multiple college and high school biotechnology programs. In 2000, the Association of Community College Trustees chose DeKloe as the Distinguished Faculty Member of the Pacific Region which includes the Western United States and Canada, Hawaii Alaska and Guam. In 2011 the Solano College faculty chose DeKloe as the Distinguished Faculty Member of the Year. In 2015, he became a finalist for the Award of Excellence for Faculty Innovation by the American Association of Community Colleges.

Dr. Ed Re, Professor of Biological Sciences and Biotechnology, has taught biotechnology at Solano College since 2004. Dr. Re earned his B.S. and Ph.D. from the University of California, Davis. Before joining the faculty of Solano College, he worked as a scientist at the biotechnology company Novozyme and developed industrial enzymes that continue to be important in the production of biofuels. In 2015, he became a finalist for the Award of Excellence for Faculty Innovation by the American Association of Community Colleges.

Mike Silva, Adjunct Professor of Biological Sciences and Biotechnology has taught at Solano College for two years. He completed an Associate of Science from Solano College in 2008 and went through the Solano College Industrial Biotechnology program. Professor Silva then completed his undergraduate education at the University of California, Santa Barbara and completed a Professional Master's degree in Biotechnology from California State University, Channel Islands. He conducted research at the City of Hope in Duarte, CA, and currently works in biomanufacturing at the Genentech Vacaville facility.

Dr. Victor Asemota, Adjunct Professor of Chemistry and Biotechnology, has taught in the Industrial Biotechnology program for two years. He earned his B.S. in Biology (Zoology) from the University of Benin in Nigeria. Dr. Asemota earned a M.D. from the St. Matthews School of Medicine (Cayman Islands), an MBA specializing in Health Care Medicine from Davenport

University (Michigan), and a Master's of Science in Chemistry from California State University, East Bay. He has extensive industrial experience, having worked in manufacturing (protein purification) at Genentech South San Francisco and also having worked at XOMA in Berkeley as a coordinator of technical training and a current Good Manufacturing Practice trainer.

Dr. Francis Faranak has been teaching as an adjunct faculty member in the biology department of Solano College for over 20 years and teaches in the biotechnology department. Dr. Faranak earned his Masters of Science at the University of San Francisco (USF) and his Ph.D at the University of California, Davis. He has extensive experience in industry, having worked in the quality department of MicroScan (a division of Baxter) in West Sacramento, as the Quality Control Supervisor of the Berkeley manufacturing plant of Bayer Pharmaceuticals, and as the Quality Control Manager of the Sacramento facility of DS Waters of America. His specialty is microbial quality control.

Dr. Rennee Moore has taught full-time at Solano College since 2004. She earned her Bachelor of Science at the University of California, Riverside and earned her Ph.D at the University of California, Davis and performed research as a Post-Doctoral Fellow at the Shriners Hospital in Sacramento, CA. She has a specialty in mammalian cell culture and in the cultivation of viruses.

Jennifer Low, the laboratory technician in charge of the biotechnology laboratory on the Solano College main campus, has served as the lab director for a decade. Jennifer earned a Bachelor's degree in food science from UC Davis. In 2015 she received the Classified Employee of the Year award at Solano College.

Christine Kucala, laboratory technician in charge of the laboratories on Solano College's Vacaville Center has worked at Solano College for over six years. She earned a Chemistry degree from St. Louis University and a Master's of Business Administration. She has extensive industry experience. She worked for Anheuser-Busch for 15 years full time and 6 years part time, working in the analytical labs, in the research pilot brewery, as a group manager of the Brewing Department, and as the Quality Assurance group manager. She also has experience in the wine industry as a quality manager overseeing Robert Mondovi, Franciscan, Simi, and Ravenswood wineries. She works part time in the laboratory of the Solano County Public Health department performing tests to assure the quality of drinking water. In 2007 her peers chose her as Classified Employee of the Year award for Solano College.

The Dean of Math and Sciences, currently Interim Dean Dr. Shirley Lewis, will directly oversee the program's development and implementation. At the executive level, the program will be supported by Dr. Leslie Minor, Vice President of Academic Affairs, Greg Brown, Vice President of Student Services, and Yulian Ligioso, Vice President of Finance and Administration, who collectively have more than 30 years of executive-level community college experience.

Superintendent/President Dr. Celia Esposito-Noy has eight years' experience as a community College Vice President. She was selected by the Board of Trustees at the new Solano College President/Superintendent in December 2015.

2. Level of assignment (at least one degree level above the baccalaureate degree for faculty assigned to baccalaureate degree courses or equivalent)

Each of the faculty members currently teaching in the Solano College Biotechnology Department has earned a degree at least one degree level above the baccalaureate degree. This applies to each of the three full-time faculty members and to the three part-time faculty. Each faculty member assigned to teach in the baccalaureate program will meet or exceed the Minimum Qualifications for Faculty in California Community Colleges; thus, all will possess at least a master's degree (<http://extranet.cccco.edu/Divisions/AcademicAffairs/InstructionalProgramsandServicesUnit/MinimumQualifications.aspx> ). As a part of the application process, the college is committed to hiring a third full time Biomanufacturing faculty member. The job description currently in development for this hiring decision reflects these minimum qualifications.

## Web Links Listing

Educational Master Plan (EMP)

[http://www.solano.edu/district\\_plans/1213/Solano\\_EMP\\_Revised\\_Draft\\_052312\\_reduced2.pdf](http://www.solano.edu/district_plans/1213/Solano_EMP_Revised_Draft_052312_reduced2.pdf)

Facilities Master Plan (FMP)

[http://www.solano.edu/district\\_plans/](http://www.solano.edu/district_plans/)

State Academic Senate Resolution

<http://www.asccc.org/resolutions/defining-parameters-california-community-college-baccalaureate-degree-title-5>

Solano College Academic Senate Meeting Minutes

[http://www.solano.edu/academic\\_senate/1415/AS%20Adopted%20Minutes%20%2011%2017%2014.pdf](http://www.solano.edu/academic_senate/1415/AS%20Adopted%20Minutes%20%2011%2017%2014.pdf)

Bachelor's Degree Press Release

[http://californiacommunitycolleges.cccco.edu/Portals/0/DocDownloads/PressReleases/MAY2015/PR\\_4YearAdd\\_5-18-2015.html](http://californiacommunitycolleges.cccco.edu/Portals/0/DocDownloads/PressReleases/MAY2015/PR_4YearAdd_5-18-2015.html)

BayBio Labor Report

<http://www.pwc.com/us/en/health-industries/pharma-life-sciences/publications/assets/pwc-california-biomedical-industry-2013.pdf>

Solano College Strategic Plan

[http://www.solano.edu/district\\_plans/1112/Mission%20Vision%20Values%20Goals%20FINAL%2020100217.pdf](http://www.solano.edu/district_plans/1112/Mission%20Vision%20Values%20Goals%20FINAL%2020100217.pdf)

Solano College Home Page

<http://www.solano.edu/>

Solano College Catalog

<http://www.solano.edu/catalog/>

Solano College Accreditation

<http://www.solano.edu/accreditation/>

Academic Freedom Policy

[http://www.solano.edu/district\\_policies/6000/Policy6430.pdf](http://www.solano.edu/district_policies/6000/Policy6430.pdf)

Solano College Curriculum Handbook

<http://www.solano.edu/curriculum/1213/Solano%20Curriculum%20Handbook.pdf>



Solano College Program Review Handbook

[http://www.solano.edu/research\\_planning/1415/Program%20Review%20Handbook%202015-2016.pdf](http://www.solano.edu/research_planning/1415/Program%20Review%20Handbook%202015-2016.pdf)

EEO Plan

<http://www.solano.edu/hr/1415/EEO%20PLAN%20SEPT%202014%20FINAL.pdf>

Minimum Qualifications for Faculty

<http://extranet.cccco.edu/Divisions/AcademicAffairs/InstructionalProgramsandServicesUnit/MinimumQualifications.aspx>

[http://californiacommunitycolleges.cccco.edu/Portals/0/FlipBooks/2014\\_MQHandbook/#/0](http://californiacommunitycolleges.cccco.edu/Portals/0/FlipBooks/2014_MQHandbook/#/0)

Solano College Bond Spending Plan

<http://www.solano.edu/measureq/2015/140820%20Measure%20Q%20BSP%20v1.pdf>

Solano College Finance and Administration

[www.solano.edu/finance\\_admin/](http://www.solano.edu/finance_admin/)

# CHARTS

## Chart 1. Program Planning and Implementation 1



Chart 1\_ Solano  
Biomanufacturing B

## Chart 2. Program Planning and Implementation 2



Chart  
2\_SolanoBiomanaufa

### Chart 3. MIS Data Elements



Chart 3\_MIS Data  
Elements.pdf

# APPENDICES

Appendix A Senate Bill 850



Appendix A\_Senate  
Bill 850.pdf

Appendix B Solano Board Minutes, November 19 2014



Appendix B\_Solano  
Board Minutes Nove



## Appendix C College Governance Mission Affirmation 2014



Appendix C\_  
College Governance

### Appendix C.1. Academic Senate Mission Affirmation



Appendix C.1\_  
Academic Senate Mi

### Appendix C.2. College Governance Revised Mission Affirmation 2016



Appendix C.2.  
College Governance

### Appendix C.3. Board Minutes June 15, 2016, Approval Revised Mission



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d minutes 16 06 15 /

### Appendix C.4. Timeline of Collegial Collaboration Solano and MiraCosta



Appendix\_C4\_Timeli  
ne of Collegial Colla

## Appendix D Biomanufacturing Student Learning Outcomes



AppendixD\_Student Learning Outcome

### Appendix D.1. Biomanufacturing Summary Course Outlines



Appendix D1\_Course Outlines

### Appendix D.2. Program Learning Outcomes



Appendix D2\_Program Learning

## Appendix E Biomanufacturing Full Course Outlines



Appendix\_E\_Course  
Outlines all Bacc.zip

## Appendix F Bachelor's Degree Pilot Handbook



Appendix  
F\_Bachelors Degree

## Appendix G Solano Upper Division Course Curriculum Rubric Worksheet



Appendix G\_Solano  
Upper Division Cour

### Appendix G.1.Solano Grading Rubric



Appendix G1\_ 4 26  
16 CC Agenda.pdf

### Appendix G.2. May 10, 2016, Curriculum Committee Agenda



Appendix G2\_05 10  
16 CC Agenda.pdf

### Appendix G.3. Board minutes June 1, 2016



Appendix G3\_Board  
16 06 01 Minutes - F

### Appendix G.4. Board of Trustees Attachments Curriculum Items



Appendix  
G4\_160601 BOT Atta

### Appendix G.5 SCCD Board of Trustees Approval of Program



**Appendix G5\_Board  
Approval of Program**

Appendix H Solano Board Minutes, October 1, 2014



Appendix H\_Solano  
Board Minutes Octo

## Appendix I Administrative Support for Bachelor's Degree



Appendix I\_  
Administrative Supp

Appendix J Approval Letter from State Chancellor's Office



Appendix  
J\_Approval Letter frc



## Appendix K Solano College Application for Pilot Program



Appendix K\_Solano  
College Application

Appendix L Solano College Supplemental Application for Pilot Program



Appendix L\_Solano  
College Supplement

## Appendix M Solano College Organizational Chart



Appendix  
M\_Solano College C

Appendix N: NSF Grant Award to Solano College



Appendix N\_NSF  
Grant Award to Sola

## Appendix O Equipment List for new Biotechnology Facility



Appendix O\_  
Equipment List for N

## Appendix P Floor Plan for new Biotechnology Facility



Appendix P\_Floor  
Plan for New Biotech

## Appendix Q NSF Equipment in Support of Biotech Program



Appendix Q\_NSF  
Equipment Support.

## Appendix R Biomanufacturing PLOs, ILOs, and Bloom's Taxonomy



Appendix\_R\_PLO  
ILO Blooms.pdf



## Appendix S Solano College Biomanufacturing Advisory Board



Appendix S\_Solano  
College Biomanufac

Appendix T Board of Governors' Approval, May 18 2015



Appendix T\_Board  
of Governors Appro

## Appendix U SCCD Delegated Oversight to Superintendent/President



Appendix U\_SCCD  
Delegated Oversight

## Appendix V SCCD Audit Verification



Appendix V\_SCCD  
Audit Verification\_R

Appendix W Solano Board Agenda to Approve Baccalaureate Program



**Appendix W\_ 16 08  
17 Board Agenda FI**

**Appendix W.1.** Solano Board Attachments to Approve Baccalaureate Program



**Appendix W.1. \_16  
08 17 Solano Board**

## Appendix X Solano Board Conflict of Interest Policy



**Appendix X Solano  
Board Conflict of In**

## Appendix Y Solano College Academic Credit and Degree Policy



Appendix Y\_Solano  
College Academic Cr

Appendix Z Solano College Updated GELOs and ILOs Board Agenda Item



**Appendix Z Solano  
College Updated GE**



Appendix AA Solano Academic Freedom Policy



Appendix AA\_  
Solano Academic Fre

## Appendix BB Biomanufacturing Program Admission Criteria (Proposed)



**Appendix BB  
Biomanufacturing P**

### Appendix BB.1. Biomanufacturing Admissions Worksheet



**Appendix  
BB\_1\_Biomanufactu**

## Appendix CC Library Resources and Books Listing



**Appendix**  
**CC\_Library Resource**

Appendix DD Solano College Provisions on Faculty and Staff Evaluation



Appendix  
DD\_Solano College