College Curriculum Committee Meeting Agenda
Tuesday, May 18, 2021
2:00 p.m. – 3:30 p.m.
Meeting will be held virtually via ConferZoom

Item	Time*	Action	Attachment(s)	Presenter(s)
1. Minutes: May 4, 2021	2 min.	Action	#5/18/21-1	Kuehnl
2. Report Out from Division Reps	5 min.	Discussion		All
3. Public Comment on Items Not on Agenda (CCC cannot discuss or take action)	5 min.	Information		
4. Announcements a. New Course Proposal b. LINC CA Approvals	5 min.	Information	#5/18/21-2	CCC Team
5. Program Deactivation: Instructional Design and Technology CA	5 min.	2nd Read/ Action	#5/18/21-3	Kuehnl
6. Local Apprenticeship AS Degree	10 min.	Action	#5/18/21-4	Kuehnl
7. New Program Application: Biochemistry AS	5 min.	1st Read	#5/18/21-5	Kuehnl
8. New Program Application: Data Analytics CA	5 min.	1st Read	#5/18/21-6	Kuehnl
9. Guided Pathways Mapping Approval Process	15 min.	1st Read	#5/18/21-7	Kuehnl
10. FSA Information Session	15 min.	Discussion		Hueg
11. CCC Priorities for 2021-22	15 min.	Discussion		Kuehnl
12. Good of the Order	3 min.			Kuehnl
13. Adjournment				Kuehnl

**Times listed are approximate*

Attachments:

#5/18/21-1 Draft Minutes: May 4, 2021
#5/18/21-2 New Course Proposal: MATH 83
#5/18/21-3 Program Deactivation: Instructional Design and Technology CA
#5/18/21-4 Cooperative Work Experience Education Plan
#5/18/21-5 New Program Application: Biochemistry AS
#5/18/21-6 New Program Application: Data Analytics CA
#5/18/21-7 Guided Pathways Program Map Approval Process—draft

2020-2021 Curriculum Committee Meetings:

Fall 2020 Quarter	Winter 2021 Quarter	Spring 2021 Quarter
~~10/6/20~~	~~1/19/21~~	~~4/20/21~~
~~10/20/20~~	~~2/2/21~~	~~5/4/21~~
~~11/3/20~~	~~2/16/21~~	5/18/21
~~11/17/20~~	~~3/2/21~~	6/1/21
~~12/1/20~~	~~3/16/21~~	6/15/21

Standing reminder: Items for inclusion on the CCC agenda are due no later than one week before the meeting.

2020-2021 Curriculum Deadlines:

~~*12/1/20*~~ Deadline to submit courses to CSU for CSU GE approval (Articulation Office).

~~*12/1/20*~~	Deadline to submit courses to UC/CSU for IGETC approval (Articulation Office).
~~*2/16/21*~~	Deadline to submit local GE applications for 2021-22 catalog (Faculty/Divisions).
~~*4/23/21*~~	Curriculum Sheet updates for 2021-22 catalog (Faculty/Divisions).
6/1/21	Deadline to submit new/revised courses to UCOP for UC transferability (Articulation Office).
6/18/21	Deadline to submit all new courses and certain types of course updates for 2022-23 catalog—see PDF for details (Faculty/Divisions).
11/5/21	Deadline to submit certain types of course updates for 2022-23 catalog—see PDF for details (Faculty/Divisions).
Ongoing	Submission of courses for C-ID approval and course-to-course articulation with individual colleges and universities (Articulation Office).

Distribution:

Micaela Agyare (LIBR), Chris Allen (Dean, APPR), Ben Armerding (LA), Rachelle Campbell (BH), Zachary Cembellin (PSME), Anthony Cervantes (Dean, Enrollment Services), Mark Ferrer (SRC), Owen Flannery (KA), Valerie Fong (Interim Dean—LA), Marnie Francisco (PSME), Evan Gilstrap (Articulation Officer), Hilary Gomes (FA), Allison Herman (LA), Kurt Hueg (Administrator Co-Chair), Maritza Jackson Sandoval (CNSL), Eric Kuehnl (Faculty Co-Chair), Andy Lee (CNSL), Debbie Lee (Acting Dean—FA & KA), Laurence Lew (BSS), Kristy Lisle (VP Instruction), Don Mac Neil (KA), Kathryn Maurer (AS President), Kent McGee (Evaluations), Michelle McNeary (LA), Ché Meneses (FA), Brian Murphy (APPR), Teresa Ong (AVP Workforce), Ron Painter (PSME), Kas Pereira (BSS), Katy Ripp (KA), Lisa Schultheis (BH), Ram Subramaniam (Dean—BH & PSME), Kella Svetich (LA), Mary Vanatta (Curriculum Coordinator), Priya Vasu (ASFC), Anand Venkataraman (PSME)

Updated 5/4/21

COLLEGE CURRICULUM COMMITTEE

Committee Members – 2020-21

Meeting Date: 5/18/21

Co-Chairs (2)

✔	Eric Kuehnl	7479	Vice President, Academic Senate (tiebreaker vote only)	kuehnleric@fhda.edu
✔	Kurt Hueg	7179	Associate Vice-President of Instruction	huegkurt@fhda.edu

Voting Membership (1 vote per division)

✔	Micaela Agyare	7086	Library	agyaremicaela@fhda.edu
	Rachelle Campbell	7469	BH	campbellrachelle@fhda.edu
✔	Zachary Cembellin	7383	PSME	cembellinzachary@fhda.edu
	Mark Ferrer		SRC	ferrermark@fhda.edu
	Owen Flannery	7213	KA	flanneryowen@fhda.edu
✔	Valerie Fong	7135	Interim Dean—LA	fongvalerie@fhda.edu
✔	Marnie Francisco	7420	PSME	franciscomarnie@fhda.edu
✔	Evan Gilstrap	7675	Articulation	gilstrapevan@fhda.edu
✔	Hilary Gomes	7585	FA	gomeshilary@fhda.edu
✔	Allison Herman	7460	LA	hermanallison@fhda.edu
✔	Maritza Jackson Sandoval	7409	CNSL	jacksonsandovalmaritza@fhda.edu
✔	Andy Lee	7783	CNSL	leeandrew@fhda.edu
	Debbie Lee	7497	Acting Dean—FA, KA	leedebbie@fhda.edu
✔	Laurence Lew	6138	BSS	lewlaurence@fhda.edu
✔	Don Mac Neil	7248	KA	macneildon@fhda.edu
✔	Ché Meneses	7015	FA	menesesche@fhda.edu
✔	Brian Murphy		APPR	brian@pttc.edu
	Ron Painter		PSME	painterron@fhda.edu
✔	Kas Pereira	7319	BSS	pereiracassandra@fhda.edu
✔	Lisa Schultheis	7780	BH	schultheislisa@fhda.edu
✔	Kella Svetich	7924	LA	svetichkella@fhda.edu
✔	Anand Venkataraman	7495	PSME	venkataramananand@fhda.edu

Non-Voting Membership (4)

	Priya Vasu		ASFC Rep.	asfc.priyav@gmail.com
✔	Mary Vanatta	7439	Curr. Coordinator	vanattamary@fhda.edu
	Kent McGee	7298	Evaluations	mcgeekent@fhda.edu
			SLO Coordinator	

Visitors

Chris Allen, Fatima Jinnah, Kristy Lisle, Teresa Ong, Kathy Perino, Ram Subramaniam

College Curriculum Committee
Meeting Minutes
Tuesday, May 4, 2021
2:00 p.m. – 3:30 p.m.
Meeting held virtually via ConferZoom

Item	Discussion
1. Minutes: April 20, 2021	**Approved by consensus.**
2. Report Out from Division Reps	**Speaker: All** PSME: Working on Title 5 updates; Math dept. creating cross-listing of BIOL 81. Library: No updates to report. Language Arts: Journalism dept. moving to Language Arts; English dept. working on Program Maps—creating multiple tracks; working on revising curriculum re: equity; finishing up COR for Ethnic Studies course in Native American Studies. Kinesiology: Working on Title 5 updates; finished FSAs; working on SLOs. Fine Arts: Art dept. course family changes approved by CCC in March being delayed until 2022-23, at request of De Anza (who are making additional changes for their courses). Division recently discussed seat counts—reviewing them closely on Title 5 updates. Counseling: Division recently held Guided Pathways Mapping Day, led by Fatima Jinnah—rep thanked those who participated and reminded them to follow up with mapping team to share any updates, if they haven't done so. BSS: No updates to report. Bio Health: Working on Title 5 updates and Distance Learning Addendum submissions; Biology dept. reviewing series of Guided Pathways. Apprenticeship: Finishing up reactivations of CWE courses. Articulation: CSU webinar re: Ethnic Studies next week, mainly for AOs, to address a lot of denials of colleges' Ethnic Studies courses for CSU GE. We still have not received our own GE results, including Ethnic Studies. Vanatta thanked the reps for their hard work in making the curriculum sheet deadline. Only four sheets missed the deadline! Ong asked reps whose divisions offer CTE courses/programs to please let her know as early as possible when creating a new CTE program. BACCC is asking colleges to both run LMI and begin discussions with other colleges in area, early in the process, in order to address potential objections before a lot of work starts to get done.
3. Public Comment on Items Not on Agenda	Fine Arts rep requested seat count as CCC discussion item before the end of this academic year.
4. Announcements a. New Course Proposal b. CCC Priorities for Remainder of Year	**Speakers: CCC Team** The following proposal was presented: CHEM 70R series. Please share with your constituents. No comments. Last year, Kuehnl surveyed reps to determine priorities for the remainder of the year. Asked the group to let him know which topics they see as

	priorities (no topics were suggested during meeting); will compile a list.
c. ASCCC Spring Plenary Update	Kuehnl shared out resolutions adopted at recent plenary. A few are curriculum-related (Section 9): Ethnic Studies, teaching modality, equity-related issues.
5. Addition to Course Family: Sculpture (Fine Arts & Communication)	**Speaker: Eric Kuehnl** Fine Arts & Communication is adding the following new course to an existing family, effective 2021-22: Sculpture—ART 4J. Fine Arts rep noted the extensive revisions to the Art dept. course families approved by CCC in March being delayed until 2022-23, so this placement is for the meantime. Motion to approve **M/S** (Venkataraman, Schultheis). **Approved.**
6. Stand Alone Approval Request: D A 65	**Speaker: Eric Kuehnl** Second read of Stand Alone Approval Request for D A 65. No comments. *See item 8 for motion/approval details.*
7. Stand Alone Approval Request: D A 66	**Speaker: Eric Kuehnl** Second read of Stand Alone Approval Request for D A 66. No comments. *See item 8 for motion/approval details.*
8. Stand Alone Approval Request: D A 200L	**Speaker: Eric Kuehnl** Second read of Stand Alone Approval Request for D A 200L. No comments. Group agreed to vote on items 6-8 as one motion. Motion to approve items 6-8 **M/S** (Venkataraman, Svetich). **Approved.**
9. Program Deactivation: Instructional Design and Technology CA	**Speaker: Eric Kuehnl** First read of deactivation of Instructional Design and Technology Certificate of Achievement. No comments. Bio Health rep asked general question about formalizing a program deactivation process, since we do not currently have one—Kuehnl believes deactivation process should be drafted along with new program creation process, and noted that processes will eventually be included in CCC bylaws being created soon. Second read and possible action will occur at next meeting.
10. Program Creation Process Ad Hoc Group	**Speaker: Eric Kuehnl** Second read of Proposal to Create New Ad Hoc Committee: Instructional Program Creation Process. No changes to document since first read. Bio Health rep pointed out that document does not mention program deactivation process. Vanatta shared she suggested (to Academic Senate President Kathryn Maurer, who helped draft proposal) proposal include both deactivation and reactivation and that Maurer mentioned another group currently creating process for program discontinuation. Vanatta believes that is primarily related to deactivations for budgetary reasons, however, and noted that programs also deactivated for other reasons. Has seen a lot of confusion due to the lack of clarity re: the steps for deactivation and reactivation, and agrees these need to be included with new creation process. Kuehnl asked if group would like to add mention of these items/processes to document—Bio Health rep thinks so, PSME rep believes that steps could be similar (for deactivation and creation), D. Lee agrees and mentioned need for information about resources. Kuehnl asked if group would agree to vote on proposal with amendment to add program deactivation process to charge for ad hoc group. Motion to amend "Charge" section of proposal to add program deactivation

	process **M/S** (Meneses, Mac Neil). **Approved.** Motion to approve amended proposal **M/S** (Svetich, Venkataraman). **Approved.** Kuehnl asked reps to reach out to him, Maurer, or Hueg if interested in participating in the group.
11. Guided Pathways Mapping Approval Process	**Speaker: Eric Kuehnl** Continuing discussion of operational aspect of approving Guided Pathways (GP) Program Maps. Kuehnl believes previous discussions leaned toward division CCs approving Maps, with consultation with other divisions when needed. Hueg agreed that division CCs the right place for dialogue and decision-making for Maps, and also acknowledged challenges re: interdisciplinary Maps (similar to Program Review challenges). Kuehnl asked group for thoughts re: required vs. recommended consultation with other divisions. Kuehnl and Hueg mentioned a few examples of cross-disciplinary programs that fall across multiple divisions. Bio Health rep asked how curriculum sheets are handled for cross-disciplinary programs. Natalie Latteri mentioned that other colleges handle cross-disciplinary programs as "exploratory pathways"—idea is for student to explore different disciplines during first term/year, but then selects one discipline to focus on. (Just an example of what other colleges are doing.) Fine Arts rep agreed with importance of discussion with other divisions, especially re: scheduling concerns. Believes deans should also be involved in discussions due to scheduling. D. Lee asked for clarification re: "approval" of Maps, and noted examples of support courses (vs. core) being listed on Maps—Kuehnl explained that GP team works with dept. faculty, and possibly dean, to create Maps; "approval" being discussed is of the final versions of the Maps. Division CCs will not be expected to have expertise. Latteri added that approving Maps won't mean students forced into specific course sequencing; approval means division (or other body) has signed off, stating that the sequence when completed will ensure student has fulfilled program requirements and outcomes. Ong asked if Maps will need to be updated every year—yes. Gilstrap agreed, noting that curriculum changes and deactivations occur each year. Bio Health rep suggested Maps be updated at the same time as curriculum sheets; also suggested determining process to make changes to Maps throughout the year, if needed (e.g., fixing an error, mid-year curriculum changes). D. Lee asked for clarification re: faculty approving Maps but deans being involved due to scheduling, which differs from curriculum sheets (since those are not tied to scheduling). Concerned that faculty approving Maps (at division CC or elsewhere) would mean deans not involved. Hueg agreed that Maps need to be tied to scheduling and that conversations need to occur when related issues come up. Kuehnl will draft resolution to bring to upcoming meeting.
12. Program Mapper Demo	**Speaker: Eric Kuehnl** Latteri is part-time faculty in Humanities dept. and co-lead of Guided Pathways Meta Majors/Program Mapping team. Provided presentation of Program Mapper software, including overview, features, and impact (re: student success and equity). Tool for students to view Maps—also includes program overview, learning outcomes, and LMI, and incorporates meta majors. Not meant to replace counseling and not replacing any curriculum software. Intent is to prevent the sort of cognitive overload that can happen to students when reading program requirements in college catalog (as these don't provide a lot of guidance). Colleges that have already

	implemented Program Mapper have seen benefits for students, especially re: equity. Latteri asked group for feedback, as Foothill is still discussing whether to adopt Program Mapper. Hueg noted always concerned when adopting new software, and asked who will be responsible for maintaining software if it is adopted. PSME rep agreed that it can be hard to evaluate software and properly assess its usefulness until it is in use. Latteri shared that initial cost is $50K and would entail .1-.2 release time for faculty to do annual review; additional people also involved in implementation, including Articulation Officer. Ong noted that BACCC might be adopting different software—Latteri explained this other software is primarily targeted to high school students and is not in competition with Program Mapper. D. Lee asked if software integrates with CourseLeaf, and if it "talks" to other colleges, noting that Foothill students take courses at many colleges and it behooves us to adopt same software as other colleges (or at least one that integrates with other systems). Latteri noted that Program Mapper is primary software being used in California and believes it will include info re: courses aligning across colleges. Latteri encouraged group to email her with any additional questions.
13. Local Apprenticeship AS Degree	**Speaker: Eric Kuehnl** Continuing general discussion of creating an Apprenticeship AS degree using GE mapping. Hueg noted that the last piece to complete degree is co-op education units (CWE courses), which require co-op plan to be approved at district level. Ong added that CWE courses are being reactivated and that goal is to have plan approved by both Foothill's and De Anza's CCCs, followed by review at Academic & Professional Matters (APM), and then FHDA board approval. CWE courses deactivated about 10 years ago (were previously offered as general courses across the campus—plan is to reactivate courses for Apprenticeship use only). PSME rep asked why degree needs co-op ed units—Allen responded that courses will allow students to earn credit for the hours of on-the-job work they do as part of the program. Kuehnl mentioned that plan will be an action item on next CCC agenda.
14. Good of the Order	
15. Adjournment	**3:23 PM**

Attendees: Micaela Agyare (LIBR), Chris Allen (Dean, APPR), Zach Cembellin (PSME), Valerie Fong (Acting Dean, LA), Marnie Francisco (PSME), Evan Gilstrap (Articulation Officer), Hilary Gomes (FA), Allison Herman (LA), Kurt Hueg (Administrator Co-Chair), Maritza Jackson Sandoval (CNSL), Eric Kuehnl (Faculty Co-Chair), Natalie Latteri (BSS), Andy Lee (CNSL), Debbie Lee (Acting Dean, FA & KA), Laurence Lew (BSS), Don Mac Neal (KA), Ché Meneses (FA), Brian Murphy (APPR), Teresa Ong (AVP Workforce), Ron Painter (PSME), Kas Pereira (BSS), Lisa Schultheis (BH), Kella Svetich (LA), Mary Vanatta (Curriculum Coordinator), Anand Venkataraman (PSME)

Minutes Recorded by: M. Vanatta

Course Change Request

New Course Proposal

Date Submitted: 04/29/21 5:45 pm

Viewing: **MATH F083. : LEARNERS ENGAGED IN ADVOCATING FOR DIVERSITY IN SCIENCE**

Last edit: 05/07/21 10:52 am

Changes proposed by: Zachary Cembellin (11250908)

In Workflow

1. 1PS Curriculum Rep
2. Curriculum Coordinator
3. Activation

Approval Path

1. 05/06/21 1:37 pm Zachary Cembellin (cembellinzachary) Approved for 1PS Curriculum Rep
2. 05/07/21 10:55 am Mary Vanatta (vanattamary): Approved for Curriculum Coordinator

Course Proposal Form

Faculty Author	Zach Cembellin		
Effective Term	Summer 2022		
Subject	Mathematics (MATH)	Course Number	F083.
Department	Mathematics (MATH)		
Division	Physical Sciences, Mathematics & Engineering (1PS)		
Units	4.0		
Hours	4 hours lecture		
Course Title	LEARNERS ENGAGED IN ADVOCATING FOR DIVERSITY IN SCIENCE		
Short Title			

Proposed Transferability
CSU Only

Proposed Description and Requisites:
This course is intended for students interested in equity, diversity, and inclusion in the sciences. Students will explore research on inclusion and diversity in STEM and health science, as well as research on interventions to enhance inclusion and diversity in those fields in higher education contexts. Students will reflect on how their own identities have impacted their experiences in science and develop strategies to promote equity in their future STEM or health science careers. Through service learning, students will co-author culturally relevant curricular materials that will expand faculty capacity to connect students' personal lives to course content. Materials developed by students will be used and assessed in STEM and/or health science courses at Foothill College, local middle schools, and/or local high schools, and will be made available for a nationwide audience of teachers and professors.

Proposed Discipline
Mathematics

To which Degree(s) or Certificate(s) would this course potentially be added?
Certificate of Achievement in Bio-Health Diversity and Inclusion Leadership

Foothill GE

Are there any other departments that may be impacted from the addition of this course?
No

Comments & Other Relevant Information for Discussion:
This course will be cross-listed with CHEM 81 and BIOL 81.

Reviewer Comments

Key: 8724

Preview Bridge

Program Deactivation: Instructional Design and Technology

Due to insufficient demand, the BSS division has decided to deactivate this program (certificate of achievement). The program courses will remain active and will likely be adapted to better serve similar programs.

BSS Division Curriculum Committee Approval: 4/26/21

Cooperative Work Experience Education Plan

Purpose: This plan adopted by the Foothill-De Anza Community College District sets forth a systematic design of Cooperative Work Experience Education whereby students, while enrolled in college, will gain realistic learning experiences through work. (§55250)

The plan was developed in consultation between the two colleges in the district. Each college provided valuable feedback and input into the plan. CTE Deans at each college also reviewed and provided feedback. Steps followed:

1. Author initial draft based on a template and meetings with other local college's with CWE programs

2. Consult with CWEE faculty from other college's and CTE Deans and Associate Vice President of Workforce Development at both colleges

3. Revise and finalize the plan

4. Forward CWEE Plan to CTE/Workforce Development Division at both colleges

5. Incorporate edits and forward to the Curriculum Coordinator at each college

6. Incorporate edits and forward to Board of Trustees

A specific description of the respective responsibilities of college, student, employer, and other cooperating agencies in the operation of the program (§55251(a)(2)):

(a) Responsibilities related to District Services (§55255):

Background: Title 5 criteria and requirements District Services. (§55255). (a) The district shall provide sufficient services for initiating and maintaining on-the-job learning stations, coordinating the program, and supervising students. The supervision of students shall be outlined in a learning agreement coordinated by the college district under a state-approved plan. The employer and the qualified Community College Instructor/Coordinator shall share responsibility for on-the-job supervision, which shall include but not be limited to:

(1) Instructor/Coordinator consultation in person with employers or designated representatives to discuss students' educational growth on the job.

(2) Written evaluation of students' progress in meeting planned on-the-job learning objectives.

(3) Consultation with students' in-person to discuss students' educational growth on the job.

(b) The district shall provide the above services at least once each quarter or semester for each student enrolled in the Cooperative Work Experience Education. Qualified adjunct faculty may be hired from other institutions to develop the learning contracts and make the "in-person" consultation for a student that is out of a college's geographical region, state, or in another country. For legally indentured

apprentices, the requirements of this section may be delegated to the Joint Apprenticeship Committee to avoid duplication of supervisory services. The responsibility for compliance with Education Code and Title 5 Cooperative Work Experience Education requirements remains with the college.

(c) In certain limited situations that will be defined in guidelines issued by the Chancellor, the district may substitute approved alternatives to "in person" consultations. The guidelines will specify the types of alternatives that districts may approve and the circumstances under which they may be used. In establishing and maintaining guidelines on such alternatives, the Chancellor shall consult with, and rely primarily on the advice and judgment of, the statewide Academic Senate and shall provide a reasonable opportunity for comment by other statewide and regional representative groups.

District/College, Student, and Employer Responsibilities regarding §55255:

The responsibility of the College is to:

1. Register students for the appropriate Cooperative Work Experience Education (CWEE) course. The prerequisite for a specific CWEE course is as written in each College catalog.

Responsibilities of the Student are to:

1. Return completed and signed FHDA Waiver and Assumption of Risk form (see appendix for forms) and required documents to the instructor including an application form, objectives agreement form, performance evaluation form, timesheet, and when applicable (unpaid internships) a Student Internship Agreement form:

(a) Return required forms at the beginning of the enrollment term and before the start of the student's work/service experience.

(b) Students who are seeking work/service experience for self-employment should complete and sign the Self-Employment form designating and identifying a supervisor/mentor for the self-employed student.

2. Report hours worked;

3. Notify college of any changes of job, supervisor, or work hours;

4. Consult college concerning job-related problems.

Responsibilities of the Employer and the Work Experience Site are:

1. Work Experience Site and employer shall meet the following criteria:

(a) Employer or designated representative agree with the intent and purpose of CWEE for students;

(b) Employers agree to facilitate each student's approved on-the-job measurable learning objectives (copy of learning objectives provided).

(c) Employers provide a reasonable probability of continuous work experience for students during the current work experience enrollment term.

(d) Employers provide adequate supervision, facilities, equipment, and materials at the work/service experience site to achieve on-the-job measurable learning objectives.

(e) Employers agree to comply with all appropriate federal and state employment regulations.

2. Employers agree to sign the following forms and complete the following activities:

(a) Evaluate student on the Performance Evaluation form at agreed-upon intervals during the student's work/service experience (i.e., midterm and end of the work experience activity).

(b) Sign and verify the student's hours worked on the Time Sheet.

(c) Meet with the College Work Experience liaison (instructor/program specialist) as agreed upon.

(d) Verify information on the Application form to establish the location of the student's employer work/service experience site and the type of duties expected.

(e) Sign the FHDA Student Internship Agreement form when applicable. For liability purposes a signed and dated form must be submitted to the CWEE/CTE office at the beginning of the enrollment term and before the student's start of the unpaid internship and the responsibility of the District is to provide resources for the fulfillment of the required District responsibilities and services as outlined in Title 5.

Responsibility of the District is to:

Responsibilities regarding Records (§55256):

Background: Title 5 criteria and requirements Records. (§55256):

(a) The district shall maintain records which shall include at least the following:

(1) The type and units of Cooperative Work Experience Education in which each student is enrolled, where the student is employed, the type of job held, and a statement signed and dated by an academic employee which sets forth the basis determining whether the student is qualified for Occupational or General Work Experience.

(2) A record of the work permit issued, if applicable, signed by the designated issuing agent.

(3) The employer's or designated representative's statement of student hours worked and evaluation of performance on the agreed-upon learning objectives. Work hours may be verified either by weekly or monthly timesheets or by a summary statement at the end of the enrollment period.

(4) New or expanded on-the-job measurable learning objectives which serve as part of the basis for determining the student's grade, signed by academic personnel, the employer or designated representative, and the student.

(b) Records must be maintained which are signed and dated by academic personnel documenting:

(1) Consultation(s) in person with the employer or designated representative.

(2) Personal consultation(s) with the student.

(3) Evaluation of the student's achievement of the on-the-job learning objectives.

(4) The final grade.

District, College, and Employer responsibilities regarding RECORDS (§55256):

1. Each College shall maintain standard written agreements related to student records. The agreement documents cover all of the above requirements and include:

(a) The type of units of CWEE in which the student is enrolled, where the student is employed including employer/supervisor contact information, job duties, number of hours the student expects to work each week, completed application (paid work experience, non-paid work experience, service-learning experience)

(b) A record of the work permit issued, if applicable, signed by the designated issuing agent

(c) Documentation of consultation with students and employers

2. The Employer shall provide records of the student's hours worked and an evaluation of the student's performance on the agreed-upon learning objectives.

3. The District shall maintain the record of the grade earned by each student in CWEE courses as part of its standard grade records system.

Responsibilities related to Student Qualifications (§55254):

Background: Title 5 criteria and requirements Student Qualifications. (§55254):

To participate in Cooperative Work Experience Education students shall meet the following criteria:

1. Pursue a planned program of Cooperative Work Experience Education which, in the opinion of the Instructor/Coordinator, includes new or expanded responsibilities or learning opportunities beyond those experienced during previous employment.

2. Have on-the-job learning experiences that contribute to their occupational or education goals.

3. Have the approval of the academic personnel. (d) Meet the following condition if self-employed: Identify a person who is approved by academic personnel to serve as the designated employer representative. This representative shall agree in writing to accept the following employer responsibilities:

(a) Assist the student in identifying new or expanded on-the-job learning objectives.

(b) Assist in the evaluation of the student's identified on-the-job learning objectives.

(c) Validate hours worked.

Responsibilities Regarding Student Qualifications (§55254):

1. Each College will publish electronic access to information and forms related to CWEE.

2. To participate, each student will meet the following criteria:

(a) Be a registered Foothill-De Anza student in good standing

(b) Participate in part-time or full-time paid employment; OR paid or unpaid internships (unpaid internships must submit a signed and dated Student Internship Agreement Form); OR an approved service-learning experience

(c) Be enrolled in a work experience course or a course with work experience or service-learning component

(d) If a minor student, obtain a current work permit (signed if applicable)

Employer responsibilities regarding Job Learning Stations (§55257):

Background: Title 5 criteria and requirements Job Learning Stations. (§55257):

Job learning stations shall meet the following criteria:

(a) Employers or designated representatives agree with the intent and purposes of Cooperative Work Experience Education for students and are given a copy of each student's approved on-the-job learning objectives.

(b) Job learning stations offer a reasonable probability of continuous work experience for students during the current work experience enrollment term.

(c) Employers or designated representatives agree to provide adequate supervision, facilities, equipment, and materials at the learning stations to achieve on-the-job learning objectives.

(d) Employers agree to comply with all appropriate federal and state employment regulations.

Employer responsibilities regarding Job Learning Stations (§55257):

1. The Employer shall:

(a) Support the intent and purposes of Cooperative Work Experience Education for students.

(b) Receive and assist with fulfilling each student's approved on-the-job learning objectives.

(c) Place each student in job learning stations that offer a reasonable probability of fulfilling the hours and objectives of the students' approved learning plan.

(d) Provide adequate supervision, facilities, equipment, and materials at the learning stations to achieve on-the-job learning objectives.

(e) Comply with all appropriate federal and state employment regulations.

Responsibilities regarding in-person consultation(s) with the employer (§55255(b) and (c)):

Background: Title 5 criteria and requirements Consultation(s) in person with the employer. (§55255):

(b) The district shall provide the above services at least once each quarter or semester for each student enrolled in the Cooperative Work Experience Education. Qualified adjunct faculty may be hired from other institutions to develop the learning contracts and make the "in-person" consultation for a student that is out of a college's geographical region, state, or in another country. For legally indentured apprentices, the requirements of this section may be delegated to the Joint Apprenticeship Committee to avoid duplication of supervisory services. The responsibility for compliance with Education Code and title 5 Cooperative Work Experience Education requirements remains with the college.

(c) In certain limited situations that will be defined in guidelines issued by the Chancellor, the district may substitute approved alternatives to "in person" consultations. The guidelines will specify the types of alternatives that districts may approve and the circumstances under which they may be used. In establishing and maintaining guidelines on such alternatives, the Chancellor shall consult with, and rely primarily on the advice and judgment of, the statewide Academic Senate and shall provide a reasonable opportunity for comment by other statewide and regional representative groups.

The district will use alternatives to "Consultation(s) in person," as described in Title §55255(c):

Responsibilities regarding in-person consultation(s) with the employer (§55255(b) and (c))

1. A qualified College representative will provide in-person consultations with the employer in most circumstances.

Responsibilities of other cooperating agencies in the operation of the program, if any (§55251):

Agencies other than employers participating in this program, such as those offering unpaid student internships, shall nevertheless fulfill the responsibilities and requirements of employers as laid out in this plan.

A specific description of each type of CWEE (§55251(a)(3)):

Types of Cooperative Work Experience Education (§55252):

Cooperative Work Experience Education is a district-initiated and district-controlled program of education consisting of the following types:

(a) General Work Experience Education is supervised employment that is intended to assist students in acquiring desirable work habits, attitudes, and career awareness. The work experience need not be related to the students' educational goals.

(b) Occupational Work Experience Education is supervised employment extending classroom-based occupational learning at an on-the-job learning station relating to the students' educational or occupational goal.

Minor Students in Work Experience All laws or rules applicable to minors in employment relationships apply to minor students enrolled in work-experience education courses. (§55250.2).

Work Experience Programs for Students with Developmental Disabilities (§55250.4):

The governing board of any community college district which establishes and supervises a work experience education program in which students with developmental disabilities are employed in part-

time jobs may use funds derived from any source, to the extent permissible by appropriate law or regulation, to pay the wages of students so employed.

The Board of Governors hereby finds and declares that the authority granted by the provisions of this section is necessary to ensure that the work experience education program will continue to provide a maximum educational benefit to students, particularly students with developmental disabilities and that such program is deemed to serve a public purpose.

Work-experience education involving apprenticeable occupations shall be consistent with the purposes of chapter 4 (commencing with section 3070) of Division 3 of the Labor Code and with standards established by the California Apprenticeship Council.

Program Highlights (Overview):

1. General, Occupational Work Experience, and Service Learning Education will be offered and encouraged in a variety of college programs.

2. Each College will ensure CWEE students receive appropriate guidance from Student Services Counselors and Admissions and Records staff.

3. Each College provides faculty, staff, college guidance personnel, and students with online access to CWEE information, support, and resources.

4. Each College will provide CWEE pre-enrollment online orientation to help students with the expectations of enrolling in an internship.

5. Disabled Student Programs and Services (DSPS) counselors and staff will assist faculty and staff in determining the best course of student guidance relevant to work

A description of HOW the district will (§55251(a)(4)) (a) provide guidance services (§55251(a)(4)(A)):

Describe the specifics on how the district will achieve this requirement:

Guidance services for work experience students will be provided as they are for all students, including face-to-face and online orientations, counseling sessions, guidance courses, and other development methods. Also, work experience students are closely guided by their Instructor and supported by staff in division offices.

(b) Assign a sufficient number of qualified certificated personnel to direct the program (§55251(a)(4)(B) and (F)):

Describe the specifics on how the district will achieve this requirement.

1. All instructors of CWEE courses shall meet Minimum Qualifications for Work Experience Instructors, as established in Title 5 Section 53416.

2. In accordance with Title 5, Section 58051(b), the student-to-instructor ratio in the Work Experience program shall not exceed 125 students per full-time equivalent academic coordinator. If enrollment exceeds 125 students per full-time equivalent instructor, the district may assign additional qualified faculty to assist in teaching, supervision of students, and consultations with employers. The district may also utilize adjunct faculty to maintain appropriate student-to-instructor ratios.

3. The number of work experience enrollments available per term is determined by the Division Dean in consultation with the faculty based on student needs. This approach allows the District to scale CWEE offerings up or down to support student completion of programs requiring CWEE courses.

4. The district will assign classified or part-time staff to assist with record-keeping and student file management requirements.

Other Regulations

Background: Title 5 criteria and requirements:

Work Experience Plan. (§55250) Any program of Cooperative Work Experience Education conducted by the governing board of a community college district according to this article and claimed for apportionment according to sections 58051 and 58009.5 shall conform to a plan adopted by the district. The plan adopted by the district shall set forth a systematic design of Cooperative Work Experience Education whereby students, while enrolled in college, will gain realistic learning experiences through work. This plan shall be submitted to and approved by the Chancellor.

Work Experience Outside of District. (§55250.6). The governing board of any community college district may provide for the establishment and supervision of work experience education programs providing part-time jobs for students in areas outside the district.

Wages and Workers' Compensation. (§55250.7). The governing board of any community college district providing work-experience and work-study education may provide for employment under such program of students in part-time jobs by any public or private employer. Such districts may pay wages to persons receiving such training, except that no payments may be to or for private employers. Districts may provide workers' compensation insurance for students in work experience as may be necessary.

Job Learning Stations. (§55257) Job learning stations shall meet the following criteria: (a) Employers or designated representatives agree with the intent and purposes of Cooperative Work Experience Education for students and are given a copy of each student's approved on-the-job learning objectives. (b) Job learning stations offer a reasonable probability of continuous work experience for students during the current work experience enrollment term. (c) Employers or designated representatives agree to provide adequate supervision, facilities, equipment, and materials at the learning stations to achieve on-the-job learning objectives. (d) Employers agree to comply with all appropriate federal and state employment regulations.

Describe the specifics on how the district will achieve this requirement:

Work Experience Plan: This document outlines the District's plan. The District achieves a systematic CWEE program leading to realistic learning experiences at work by (a) incorporating work experience requirements into appropriate CTE programs of study and (b) ensuring that each participating Student, under guidance by an Instructor, establishes and achieves appropriate learning objectives while also meeting the hours of work required per unit of credit. Each participating student completes a thorough application/contract in consultation with the Employer and Instructor. The Employer and Instructor verify that the work environment will provide appropriate learning opportunities for the Student. During the course, the Instructor is required to engage with the Student for progress updates. Upon conclusion

of the course, the Employer provides feedback on the Student's learning and mastery of planned skills and the Instructor determines the final grade.

Work Experience Outside the District: The Employer may be located in an area outside of the district. In such a case, appropriate supervision will occur by the Instructor traveling to the area for site visits or utilizing an alternative to in-person visits, or a qualified adjunct instructor will be selected from that area and paid by the college to oversee the Student's learning.

Wages: The District may provide CWEE to students on or off-campus, in part-time jobs, paid or unpaid internships offered by public or private employers, or service learning opportunities with local organizations. Federal Work-Study (FWS) students are permitted to enroll in Cooperative Work Experience Education. FWS restricts wages to off-campus private or public employers. However, the district retains the right to review its FWS funding policy.

Workers Compensation: As indicated in section 78249 of the California Education Code, the District shall be considered the employer of UNPAID students enrolled in the CWEE program for the limited purpose of providing worker's compensation. Students paid by the employer shall be under the Employer's Worker's compensation and/or liability insurance. When CWEE Students are employed on campus, the District's Workers Compensation Insurance provides protection. In this way, all CWEE Students are protected, regardless of Employer.

Work Experience Site: Employers or designated representatives provide adequate supervision, facilities, equipment, and materials at the job learning stations to achieve on-the-job measurable learning objectives. All employers of work/service experience students agree to these criteria when signing the learning contract. Employers or designated representatives are given a copy of the document.

Coordinate the program and supervise students (§55251):

Describe the specifics on how the district will achieve this requirement:

Coordination and supervision of students are accomplished through a combination of faculty, staff, and administrative effort.

Faculty: Each faculty member oversees the learning of the CWEE students they are supervising. Like any other course, the faculty member is the subject matter expert responsible to establish appropriate learning objectives and assess the extent to which each student has met those objectives. Submitting required records for each student is a necessary and expected activity for every class. Forms and learning contracts for CWEE courses are designed to efficiently capture all necessary components and records.

Staff: CTE Division office staff members and others assist in promoting CWEE opportunities, recruiting participants, and at times connecting interested students with interested employers. Once a student has determined an appropriate CWEE employment/learning site, staff members distribute and collect the paperwork to instructors and/or students, assist in getting students fully signed up for the program and registered for the class, and facilitate end-of-semester submission and archiving of required course records.

Administration: Division Deans, Associate Vice President of Workforce Development overseeing CTE programs and/or provide administrative direction to ensure that faculty and staff are each completing

their designated responsibilities and that the program operates in accordance with all applicable regulations. The Foothill-De Anza Community College District Cooperative Work Experience Education Plan at each college, Division Deans, and the Associate Vice President of Workforce Development further oversee the CWEE instructional program to ensure ongoing compliance with regulations, maintenance of instructional quality, and student achievement of expected learning objectives.

Shared supervision with the employer to include (at least once each term) (§55251):

(a) Assure on-the-job experiences are documented with written/measurable objectives (§55251(a)(4)(C))

Describe the specifics on how the district will achieve this requirement:

After establishing an appropriate CWEE employment opportunity, the Instructor works with each Student to establish appropriate learning objectives that reflect new or expanded job-related responsibilities, that the student will be required to complete by the end of the semester. These are reviewed with the Employer to ensure they can be met, then recorded on the Workplace Project Agreement Form, which represents the student's learning contract. The Student, Employer, and Instructor all sign the contract indicating their support of these objectives. When necessary, these learning objectives can be adjusted with a consultation with the Employer, Instructor, and Student, verifying their adjustments with new signatures.

At least once each term, a college representative will conduct employer/supervisor consultations (in-person or through alternative methods) with each workplace employer/supervisor to evaluate each student's on-the-job educational growth. All in-person consultations and alternatives to in-person consultations will be documented.

Evaluate with the employer, student's learning experiences (§55251(a)(4)(D)):

Describe the specifics on how the district will achieve this requirement:

As above, an in-person or alternative consultation will occur at least once. As a component of this consultation, the Instructor will discuss the Student's progress with the Employer.

The Instructor and Student shall meet to discuss their progress toward meeting the learning objectives. Feedback from the Employer is shared with the Student at this time. Evidence of this meeting is captured as part of course records.

Upon conclusion of the course, the Employer submits an assessment of the Student's performance in mastering the learning objectives, along with other feedback, including "soft skills" where the student excelled or needs improvement. The Instructor determines the course grade, informed by this feedback.

Describe the basis for awarding grade and credit (§55251(a)(4)(E)):

(a) One student contact hour is counted for each unit of work experience credit in which a student is enrolled during any census period. In no case shall duplicate student contact hours be counted for any classroom instruction and Cooperative Work Experience Education. The maximum contact hours counted for a student shall not exceed the maximum number of Cooperative Work Experience Education units for which the student may be granted credit as described in section 55253.

(b) The learning experience and the identified on-the-job learning objectives shall be sufficient to support the units to be awarded.

(c) The following formula will be used to determine the number of units to be awarded:

(1) Every 75 hours of paid work equals one-semester credit or 50 hours equals one-quarter credit.

(2) Every 60 hours of non-paid work equals one-semester credit or 40 hours equals one-quarter credit.

Credit earned is contingent upon the student satisfying the minimum hour's requirements and completing adequate progress toward the agreed-upon learning objectives. In accordance with Title 5, section 55025, the Instructor shall determine the grade to be awarded to each student.

Provide adequate clerical & instructional services (§55251(a)(4)(F)):

The CWEE program requires clerical support, primarily consisting of helping distribute and collect paperwork at the beginning and end of the term and collecting and filing evidence of in-person and alternative consultations and Employer feedback on student performance. Oversight of student learning is the responsibility of the Instructor. Other instructional services include those of the Workforce Development Department. The former assists students in securing CWEE opportunities and promoting the program, while the latter assist with registration, enrollment, and course grade issues.

Foothill College
Credit Program Narrative
Associate in Science in Biochemistry

Item 1. Program Goals and Objectives

Biochemistry graduates will find an impressive array of opportunities for exciting careers in a wide range of fields due to their coursework in chemistry and biology. Potential careers include basic research, pharmaceuticals, biotechnology, forensic science, food science, environmental protection, new product and process development, and education. Aside from careers in research and development in the chemical industry, there is a need for technically trained people in non-traditional areas such as marketing and sales, scientific information, patent law, health and safety, and handling of hazardous materials. Academic careers for biochemists include university teaching and science teaching in secondary schools, an area that will expand greatly in the future. A bachelor's degree can also provide a strong foundation for graduate study at medical, dental, veterinary, and pharmacy schools. Students with biochemistry degrees have been notably successful in these areas.

Program Learning Outcomes:

- Students will have knowledge of current theories and applications in the fields of chemistry and biology.
- Students will demonstrate skill in researching, assessing and evaluating topics of interest.
- Students will communicate effectively using the language of chemistry.
- Students will have facility in the safe handling of chemicals and the execution of common chemistry and biology laboratory techniques.

Item 2. Catalog Description

The major in biochemistry is primarily intended for students who plan to transfer to a four-year institution to earn a bachelor's degree. Students who graduate with a bachelor's degree in biochemistry will be able to pursue a wide range of career opportunities in chemistry, biology, and related fields. In addition, biochemistry majors will take coursework similar to that required for admission to medical, dental, veterinary, and pharmacy schools.

Item 3. Program Requirements

Requirements	Course #	Title	Units	Sequence
Core Courses (60-62 units)	CHEM 1A OR	General Chemistry	5	Year 1, Fall
	CHEM 1AH	Honors General Chemistry	5	Year 1, Fall
	CHEM 1B OR	General Chemistry	5	Year 1, Winter
	CHEM 1BH	Honors General Chemistry	5	Year 1, Winter
	CHEM 1C	General Chemistry & Qualitative Analysis	5	Year 1, Spring

	CHEM 12A	Organic Chemistry	4	Year 2, Fall
	CHEM 12AL	Organic Chemistry Laboratory	2	Year 2, Fall
	CHEM 12B	Organic Chemistry	4	Year 2, Winter
	CHEM 12BL OR CHEM 13BH	Organic Chemistry Laboratory Honors Organic Chemistry Laboratory	2 3	Year 2, Winter Year 2, Winter
	CHEM 12C	Organic Chemistry	4	Year 2, Spring
	CHEM 12CL OR CHEM 13CH	Organic Chemistry Laboratory Honors Organic Chemistry Laboratory	2 3	Year 2, Spring Year 2, Spring
	And 3 of the following:			
	MATH 1A OR MATH 1AH	Calculus Honors Calculus I	5 5	Year 1, Fall Year 1, Fall
	MATH 1B OR MATH 1BH	Calculus Honors Calculus II	5 5	Year 1, Winter Year 1, Winter
	MATH 1C	Calculus	5	Year 1, Spring
	MATH 1D	Calculus	5	Year 2, Fall
	MATH 2A	Differential Equations	5	Year 2, Winter
	And 2 of the following:			
	BIOL 1A	Principles of Cell Biology	6	Year 2, Fall
	BIOL 1B	Form & Function in Plants & Animals	6	Year 2, Winter
	BIOL 1C	Evolution, Systematics & Ecology	6	Year 2, Spring

TOTAL UNITS: 60-62 units

Proposed Sequence:
Year 1, Fall = 10 units
Year 1, Winter = 10 units
Year 1, Spring = 10 units
Year 2, Fall = 12 units
Year 2, Winter = 12-13 units
Year 2, Spring = 6-7 units

TOTAL UNITS: 60-62 units

Item 4. Master Planning

Biochemistry is one of the fastest-growing disciplines within chemistry where biochemists play a key role in pharmaceutical and medical science research and development. In addition, the San Francisco Bay Area is a hub for medical technology and biotechnology in general. Students who graduate from Foothill College with a degree in biochemistry would be adequately prepared for transfer to a bachelor's program in a four-year institution where they could complete their training and join the workforce. Moreover, Foothill College is engaged in several initiatives that aim to increase the number of underrepresented populations in STEM fields. There is a great need for increased diversity in STEM disciplines, including biochemistry. A degree program at Foothill would be attractive to many students and encourage them to pursue careers in this exciting discipline. Finally, many students enroll in chemistry and biology courses to fulfill requirements for medical, dental, veterinary, and pharmacy school. Offering a degree in biochemistry would enable them to complete a substantial part of their preparations towards this career goal.

Item 5. Enrollment and Completer Projections

We estimate 30 students a year would complete the requirements for the Biochemistry AS degree, which is equivalent to 150 students over five years. This is based on historical enrollment in, and completion of, the CHEM 12 series as well as an estimate of the number of CHEM 12 students who are concurrently enrolled in biology courses.

		Year 1 – 2018-2019		Year 2 – 2019-2020	
Course #	Course Title	Annual Sections	Annual Enrollment	Annual Sections	Annual Enrollment
CHEM 1A/ 1AH	General Chemistry/ Honors General Chemistry	18	480	18	461
CHEM 1B/ 1BH	General Chemistry/ Honors General Chemistry	14	328	13	313
CHEM 1C	General Chemistry & Qualitative Analysis	9	213	8	186
CHEM 12A	Organic Chemistry	3	146	3	113
CHEM 12AL	Organic Chemistry Laboratory	6	133	5	99

CHEM 12B	Organic Chemistry	3	123	3	83
CHEM 12BL/ 13BH	Organic Chemistry Laboratory/Honors Organic Chemistry Laboratory	5	105	4	76
CHEM 12C	Organic Chemistry	3	74	4	86
CHEM 12CL/ 13CH	Organic Chemistry Laboratory/Honors Organic Chemistry Laboratory	4	71	4	81
MATH 1A	Calculus	25	959	24	914
MATH 1AH	Honors Calculus I	0	0	1	43
MATH 1B/ 1BH	Calculus/Honors Calculus II	21	754	22	839
MATH 1C	Calculus	13	500	18	606
MATH 1D	Calculus	10	314	10	322
MATH 2A	Differential Equations	7	238	7	246
BIOL 1A	Principles of Cell Biology	8	193	9	210
BIOL 1B	Form & Function in Plants & Animals	5	156	7	141
BIOL 1C	Evolution, Systematics & Ecology	4	118	4	110

Item 6. Place of Program in Curriculum/Similar Programs

The Biochemistry AS degree program is designed to be complementary to the existing Chemistry AS degree program, where this program requires two biology courses rather than two physics courses. In addition, the Biochemistry AS degree program is different from the Biological Sciences AS degree program and the Biology AS-T program, in that neither of the latter programs have organic chemistry or calculus as core program requirements. The increased coursework within the Biochemistry AS degree relative to other local degrees is more aligned with the lower-division coursework required for Biochemistry BS degree programs at four-year institutions.

Item 7. Similar Programs at Other Colleges in Service Area

Most community colleges in Foothill's service area either do not offer a chemistry degree at all or offer a chemistry degree without biology as a core requirement. Likewise, most community colleges offer various biology degrees but are missing organic chemistry as a core program requirement.

Three exceptions were found, however:

- City College of San Francisco offers a six-semester Biology AS degree that covers the same biology, chemistry, and math requirements as this degree.
- Ohlone College offers a Biology AS degree with the same core requirements as this degree, but with only one semester of calculus instead of two.
- Las Positas College offers a Biology UC Pathway AS degree with the same core requirements as this degree program.

Additional Information Required for State Submission:

TOP Code: 1905.00 – Chemistry, General

Annual Completers: 30

Faculty Workload: 1.333

New Faculty Positions: 0

New Equipment: $0

New/Remodeled Facilities: $0

Library Acquisitions: $0

Gainful Employment: Yes

Program Review Date: Summer, 2027

Distance Education: 0%

Articulation Agreement by Major

Effective during the 2020-2021 Academic Year

To: California Polytechnic University, San Luis Obispo 2020-2021 General Catalog, Quarter	From: Foothill College 2020-2021 General Catalog, Quarter

BIOCHEMISTRY, B.S.

TRANSFER INFORMATION & ONLINE RESOURCES

WHAT COURSE CREDIT WILL TRANSFER FOR THIS MAJOR?

This view is By Major and shows lower division courses within BS Biochemistry for the academic year (Fall to Summer) 2020-2021 – these are listed to the left, with articulated courses from the sending institution listed to the right. Where combinations of courses exist, some duplication may occur.

Courses are listed under three sections: **Major Courses, Support Courses** and **Other Courses**. All students in the major will take **Major and Support Courses**. Courses that are either in Concentrations, Areas of Emphasis or an Elective for the major are grouped in the **Other Courses** section. As a result, this section will vary in capacity and not all courses listed may be relevant to the course of study being pursued. Resources are provided below to confirm the exact lower division courses required.

Upper Division, General Education (GE) and free elective coursework are not listed here.

Both GE and course credit are awarded when an incoming articulated course is approved for GE. Where articulation is established but the transfer course is not approved for GE, only course credit is awarded.

As noted at the top of this agreement, Cal Poly SLO is on the Quarter system – all Cal Poly course units will reflect this.

WHAT COURSES NEED TO BE TAKEN TO BE A COMPETITIVE TRANSFER APPLICANT?

Not all the articulated courses listed below are required to be a competitive transfer applicant for this major.

It is ESSENTIAL that transfer applicants first review the Admissions webpages concerning Selection Criteria for Transfer Students and Major Specific Transfer Criteria.

Selection Criteria for Transfer Students can be found here:

http://admissions.calpoly.edu/applicants/transfer/criteria.html

Major Specific Transfer Criteria is linked from the Selection Criteria page, and indicates both required and recommended coursework. Applicants should take note of these courses, and refer to their potential articulation in ASSIST through either Articulation Agreements by Major, by Department or by Prefix. Credit is extended based on the academic year in which the transfer course was taken.

RESOURCES TO USE WITH ASSIST

ASSIST only provides certain information; use the resources below for a more complete overview of this major.

2020-2021 Catalog information on BS Biochemistry can be found here: http://catalog.calpoly.edu/

The Curriculum Sheet for BS Biochemistry can be found here: http://flowcharts.calpoly.edu

NOTE CONCERNING "OTHER COURSES" SECTION FOR THIS MAJOR

- This major offers the choice of either 12 units of Advanced Biochemistry electives or 18 units of Polymers and Coatings concentration. Lower division course is listed.
- This major has no areas of emphasis.
- Although not listed here, this major has 9-16 units of free electives.

MAJOR COURSES

CHEM 124 - General Chemistry for Physical Science and Engineering I (4.00)	←	**CHEM 1A** - General Chemistry (5.00) **--- Or ---** **CHEM 1AH** - Honors General Chemistry (5.00)
CHEM 125 - General Chemistry for Physical Science and Engineering II (4.00)	←	**CHEM 1B** - General Chemistry (5.00) **--- Or ---** **CHEM 1BH** - Honors General Chemistry (5.00)
CHEM 126 - General Chemistry for Physical Science and Engineering III (4.00)	←	**CHEM 1C** - General Chemistry & Qualitative Analysis (5.00)

CHEM 216 - Organic Chemistry I (5.00)	←	No Course Articulated
CHEM 217 - Organic Chemistry II (4.00)	←	No Course Articulated
CHEM 218 - Organic Chemistry III (3.00)	←	No Course Articulated
CHEM 216 - Organic Chemistry I (5.00) **--- And ---** **CHEM 217** - Organic Chemistry II (4.00)	←	**CHEM 12A** - Organic Chemistry (4.00) **--- And ---** **CHEM 12B** - Organic Chemistry (4.00) **--- And ---** **CHEM 12C** - Organic Chemistry (4.00)
CHEM 216 - Organic Chemistry I (5.00) **--- And ---** **CHEM 217** - Organic Chemistry II (4.00) **--- And ---** **CHEM 218** - Organic Chemistry III (3.00)	←	**CHEM 12A** - Organic Chemistry (4.00) **--- And ---** **CHEM 12B** - Organic Chemistry (4.00) **--- And ---** **CHEM 12C** - Organic Chemistry (4.00)
CHEM 221 - Organic Chemistry Laboratory II (2.00)	←	No Course Articulated

SUPPORT COURSES

BIO 161 - Introduction to Cell and Molecular Biology (4.00)	←	**BIOL 1A** - Principles of Cell Biology (6.00)
MATH 141 - Calculus I (4.00) Same-As: HNRS 141	←	**MATH 1A** - Calculus (5.00) **--- Or ---** **MATH 1AH** - Honors Calculus I (5.00)
MATH 142 - Calculus II (4.00) Same-As: HNRS 142	←	**MATH 1B** - Calculus (5.00)
MATH 143 - Calculus III (4.00) Same-As: HNRS 143	←	**MATH 1C** - Calculus (5.00)
MATH 141 - Calculus I (4.00) Same-As: HNRS 141 **--- And ---** **MATH 142** - Calculus II (4.00) Same-As: HNRS 142	←	**MATH 1A** - Calculus (5.00) **--- And ---** **MATH 1B** - Calculus (5.00)
MATH 141 - Calculus I (4.00) Same-As: HNRS 141 **--- And ---** **MATH 142** - Calculus II (4.00) Same-As: HNRS 142 **--- And ---** **MATH 143** - Calculus III (4.00) Same-As: HNRS 143	←	**MATH 1A** - Calculus (5.00) **--- And ---** **MATH 1B** - Calculus (5.00) **--- And ---** **MATH 1C** - Calculus (5.00)
MCRO 224 - General Microbiology I (5.00)	←	**BIOL 41** - Microbiology (6.00)
PHYS 141 - General Physics IA (4.00) Same-As: HNRS 134	←	**PHYS 4A** - General Physics (Calculus) (6.00)
PHYS 132 - General Physics II (4.00) Same-As: HNRS 132	←	**PHYS 4C** - General Physics (Calculus) (6.00)
PHYS 133 - General Physics III (4.00)	←	**PHYS 4B** - General Physics (Calculus) (6.00)
PHYS 141 - General Physics IA (4.00) Same-As: HNRS 134 **--- And ---** **PHYS 132** - General Physics II (4.00) Same-As: HNRS 132 **--- And ---** **PHYS 133** - General Physics III (4.00)	←	**PHYS 4A** - General Physics (Calculus) (6.00) **--- And ---** **PHYS 4C** - General Physics (Calculus) (6.00) **--- And ---** **PHYS 4B** - General Physics (Calculus) (6.00)

OTHER COURSES (CONCENTRATION/EMPHASIS/ELECTIVES)

****REFER TO TOP OF AGREEMENT****
****REFER TO CATALOG****

CHEM 252 - Laboratory Glassblowing (1.00)	←	No Course Articulated

END OF AGREEMENT

Articulation Agreement by Major

Effective during the 2020-2021 Academic Year

To: California State University, East Bay 2020-2021 General Catalog, Semester	From: Foothill College 2020-2021 General Catalog, Quarter

Biochemistry, B.S.

PLEASE NOTE: ASSIST Next Gen is a new system and does not replace the assistance of meeting with an adviser. Please contact AACE at (510) 885-3621 for an advising appointment. The most accurate and up to date transfer information for CSU East Bay is available at this link: CSUEB Equivalencies

All California Community College transfer students are encouraged to complete

their CSU General Education pattern at their Community College prior to enrollment at CSU, East Bay.

BIOCHEMISTRY, B.S. PROGRAM (120 UNITS)

Program Description

The Department of Chemistry and Biochemistry provides a strong education in chemistry and biochemistry that prepares its students to function and thrive in our society. The department attempts to increase the problem solving and critical thinking skills of all students. Non-science students learn about the scientific and chemical aspects of everyday life that allow them to understand issues related to the environment, energy production, disease prevention, and nutrition. Students of the sciences learn the fundamentals of chemistry that control the interactions of elements and molecules which form the building blocks in nature. Chemistry majors receive extensive instruction in predicting chemical reactivity. Building on an understanding of mathematics, physics, and biology, chemistry majors receive a background in the major disciplines of chemistry including inorganic, analytical, organic, physical, and biochemistry. Students learn the protocols and techniques for working safely with chemicals. The department recognizes the importance of the pursuit of new knowledge in the development of skilled scientists and productive members of society, and encourages its students to participate in research projects and cooperative educational opportunities.

The undergraduate programs offered by the department include: Chemistry, B.S.; Biochemistry, B.S.; Chemistry, Forensic Science Option, B.S.; Chemistry, B.A.; Chemistry, Chemistry Education Option, B.A.; Biochemistry, B.A.; Biochemistry, Chemistry Education Option, B.A.; and a Chemistry Minor. Descriptions of these programs and their requirements are listed below. (See the Department of Chemistry and Biochemistry (Graduate) for descriptions of the department's Chemistry, M.S. and M.S. Option in Biochemistry.)

The Chemistry, B.S. degree is approved by the American Chemical Society (ACS). A certified degree is a valuable credential that serves as national-level recognition for completing a rigorous academic chemistry curriculum in an ACS-approved department. The extra rigor of an ACS certified degree is valued by both potential employers and graduate schools.

Degree Requirements Unit-Outline

- A baccalaureate of science degree requires a total of 120 units:
  - The major requirements consists of 75 units;
  - General Education (GE) & Graduation Requirements (GR) consists of 57 units;
  - Free Electives may consist of 0 units (actual # of free elective units may depend on GE/GR units).

Note: It may be possible to double-count units within the graduation requirements or that a course may satisfy both a graduation requirement and a major requirement. Students should contact their transfer advisors for information.

LOWER DIVISION CORE

BIOL 140A - Principles of Cell and Molecular Biology (5.00) **--- And ---** **BIOL 140B** - Principles of Organismal Biology (5.00)	←	**BIOL 1A** - Principles of Cell Biology (6.00) **--- And ---** **BIOL 1B** - Form & Function in Plants & Animals (6.00) **--- And ---** **BIOL 1C** - Evolution, Systematics & Ecology (6.00)

CHEM 111 - GENERAL CHEMISTRY I (5.00) **--- And ---** **CHEM 112** - GENERAL CHEMISTRY II (5.00)	←	**CHEM 1A** - General Chemistry (5.00) **--- And ---** **CHEM 1B** - General Chemistry (5.00) **--- And ---** **CHEM 1C** - General Chemistry & Qualitative Analysis (5.00)

--- Or ---

CHEM 111 - GENERAL CHEMISTRY I (5.00) • *Articulates as a sequence only*	←	Articulates as a Series Only
--- And ---		
CHEM 112 - GENERAL CHEMISTRY II (5.00) • *Articulates as a sequence only*	←	Articulates as a Series Only
CHEM 220 - QUANTITATIVE ANALYSIS (4.00)	←	No Course Articulated
MATH 130 - CALCULUS I (4.00) **--- And ---** **MATH 131** - CALCULUS II (3.00) **--- And ---** **MATH 230** - CALCULUS III (3.00)	←	**MATH 1A** - Calculus (5.00) **--- And ---** **MATH 1B** - Calculus (5.00) **--- And ---** **MATH 1C** - Calculus (5.00) **--- And ---** **MATH 1D** - Calculus (5.00)
--- Or ---		
MATH 130 - CALCULUS I (4.00)	←	**MATH 1A** - Calculus (5.00)
--- And ---		
MATH 131 - CALCULUS II (3.00)	←	**MATH 1B** - Calculus (5.00)
--- And ---		
MATH 230 - CALCULUS III (3.00)	←	**MATH 1C** - Calculus (5.00) **--- And ---** **MATH 1D** - Calculus (5.00)
PHYS 135 - Physics for Scientists and Engineers I (4.00)	←	Articulates as a Series Only
PHYS 136 - Physics for Scientists and Engineers II (4.00)	←	Articulates as a Series Only

END OF AGREEMENT

Articulation Agreement by Major

Effective during the 2020-2021 Academic Year

To: San Francisco State University 2020-2021 General Catalog, Semester	From: Foothill College 2020-2021 General Catalog, Quarter

Biochemistry, B.S.

IMPACTION UPDATE

Effective Fall 2020, impaction status for the B.S. Biochemistry program is discontinued. Regular admission criteria in effect for those applying for the Fall 2020 term and beyond.

ASSOCIATE DEGREE FOR TRANSFER INFORMATION

The AS-T in Chemistry (SB 1440 degree) is an approved transfer pathway for this major. Visit **SF State ADT Pathways and Roadmaps** for a list of all approved ADT pathways for SF State degree programs and to view sample post-transfer advising roadmaps for each pathway.

Students preparing to transfer into this major at SF State should complete any available articulated courses in the Requirement Information section(s) below. Completion of the American Institutions requirement (US-1, US-2, US-3) before transfer is also strongly recommended.

PREPARATION NOTE

Completion of a course articulated to CHEM 115 is recommended before transfer.

Note that all students are required to take a department-administered placement exam for CHEM 115 at SF State. *Students may enroll for CHEM 115 prior to taking the exam.* This exam is offered on two dates prior to the start of each semester. **More information about the placement exam here**.

EXTERNAL EXAMINATION CREDIT

Credit for Advanced Placement available for students in this major with qualifying scores. **More information here.**

UPPER DIVISION COURSE REQUIREMENT INFORMATION

This agreement involves articulation of lower division coursework completed at a transfer institution with upper division major requirements at SF State. If taken before transfer, the requirement in the major at SF State has been met. However, units earned for lower division courses taken before transfer will not be used to satisfy minimum ***upper division*** unit requirements for the major or the degree at SF State.

CATALOG INFORMATION

San Francisco State University Bulletin (catalog): **bulletin.sfsu.edu**

- **Academic Programs:** Major and minor programs
- **Undergraduate Education:** GE and other graduation requirements; AP/IB/CLEP
- **Course Index:** Course descriptions

CONTACT

Visit the department website

Questions regarding articulation: artic@sfsu.edu

LOWER DIVISION MAJOR REQUIREMENTS

Must be taken for a letter grade
Minimum grade required: C or better

BIOL 230 - Introductory Biology I (5.00)	←	**BIOL 1A** - Principles of Cell Biology (6.00)
CHEM 115 - General Chemistry I: Essential Concepts of Chemistry (5.00)	←	**CHEM 1A** - General Chemistry (5.00) **--- And ---** **CHEM 1B** - General Chemistry (5.00) **--- Or ---** **CHEM 1A** - General Chemistry (5.00) **--- And ---** **CHEM 1BH** - Honors General Chemistry (5.00) **--- Or ---** **CHEM 1AH** - Honors General Chemistry (5.00) **--- And ---** **CHEM 1BH** - Honors General Chemistry (5.00) **--- Or ---** **CHEM 1AH** - Honors General Chemistry (5.00) **--- And ---** **CHEM 1B** - General Chemistry (5.00)
CHEM 215 - General Chemistry II: Quantitative Applications of Chemistry Concepts (3.00)	←	**CHEM 1B** - General Chemistry (5.00) **--- And ---** **CHEM 1C** - General Chemistry & Qualitative Analysis (5.00) **--- Or ---** **CHEM 1BH** - Honors General Chemistry (5.00) **--- And ---** **CHEM 1C** - General Chemistry & Qualitative Analysis (5.00)
CHEM 216 - General Chemistry II Laboratory: Quantitative Applications of Chemistry Concepts (2.00)	←	**CHEM 1B** - General Chemistry (5.00) **--- And ---** **CHEM 1C** - General Chemistry & Qualitative Analysis (5.00) **--- Or ---** **CHEM 1BH** - Honors General Chemistry (5.00) **--- And ---** **CHEM 1C** - General Chemistry & Qualitative Analysis (5.00)
CHEM 233 - Organic Chemistry I (3.00)	←	**CHEM 12A** - Organic Chemistry (4.00) **--- And ---** **CHEM 12B** - Organic Chemistry (4.00)
CHEM 234 - Organic Chemistry I Laboratory (2.00)	←	**CHEM 12AL** - Organic Chemistry Laboratory (2.00) **--- And ---** **CHEM 12BL** - Organic Chemistry Laboratory (2.00) **--- Or ---** **CHEM 13AH** - Honors Organic Chemistry Laboratory (3.00) **--- And ---** **CHEM 13BH** - Honors Organic Chemistry Laboratory (3.00)

CHEM 335 - Organic Chemistry II (3.00)

- ***REFER TO TOP OF AGREEMENT***
- *Content credit only*

←

CHEM 12B - Organic Chemistry (4.00)

--- And ---

CHEM 12C - Organic Chemistry (4.00)

- *Lower division credit only*
- *No upper division credit*

MATH 226 - Calculus I (4.00)

←

MATH 1A - Calculus (5.00)

--- And ---

MATH 1B - Calculus (5.00)

--- Or ---

MATH 1AH - Honors Calculus I (5.00)

--- And ---

MATH 1B - Calculus (5.00)

--- Or ---

MATH 1A - Calculus (5.00)

--- And ---

MATH 1BH - Honors Calculus II (5.00)

--- Or ---

MATH 1AH - Honors Calculus I (5.00)

--- And ---

MATH 1BH - Honors Calculus II (5.00)

MATH 227 - Calculus II (4.00)

←

MATH 1B - Calculus (5.00)

--- And ---

MATH 1C - Calculus (5.00)

--- Or ---

MATH 1BH - Honors Calculus II (5.00)

--- And ---

MATH 1C - Calculus (5.00)

Select 1 Sequence from the following

PHYS 111 - General Physics I (3.00)

←

PHYS 2A - General Physics (5.00)

--- And ---

PHYS 2B - General Physics (5.00)

PHYS 112 - General Physics I Laboratory (1.00)

←

PHYS 2A - General Physics (5.00)

--- And ---

PHYS 2B - General Physics (5.00)

PHYS 121 - General Physics II (3.00)

←

PHYS 2B - General Physics (5.00)

--- And ---

PHYS 2C - General Physics (5.00)

PHYS 122 - General Physics II Laboratory (1.00)

←

PHYS 2B - General Physics (5.00)

--- And ---

PHYS 2C - General Physics (5.00)

--- Or ---

PHYS 220 - General Physics with Calculus I (3.00)	⟵	**PHYS 4A** - General Physics (Calculus) (6.00)
PHYS 222 - General Physics with Calculus I Laboratory (1.00)	⟵	**PHYS 4A** - General Physics (Calculus) (6.00)
PHYS 240 - General Physics with Calculus III (3.00)	⟵	**PHYS 4C** - General Physics (Calculus) (6.00)
PHYS 242 - General Physics with Calculus III Laboratory (1.00)	⟵	**PHYS 4C** - General Physics (Calculus) (6.00)

END OF AGREEMENT

Articulation Agreement by Major

Effective during the 2020-2021 Academic Year

To: University of California, Berkeley	From: Foothill College
2020-2021 General Catalog, Semester	2020-2021 General Catalog, Quarter

Chemical Biology, Lower Division B.S.

COLLEGE ADMISSION REQUIREMENTS

The major in **Chemical Biology** is offered by the College of Chemistry. The major provides an understanding of the chemical principles of biological function by emphasizing the development of a solid background in chemistry. In addition to an introductory set of math and physics courses and a broad selection of the same chemistry courses required for the chemistry major, students pursuing the chemical biology major take general and cell biology, biochemistry, biological macromolecular synthesis, and bioinorganic chemistry. The curriculum highlights organic chemistry, quantitative thermodynamics, and kinetics, subjects necessary for understanding the logic of biological systems. The Chemical Biology major is intended for students who are interested in careers as professional chemists, or in the biological sciences including the biomedical, biotechnology, and pharmaceutical industries.

Please note that Chemical Biology is distinct from Biochemistry. Biochemistry at UC Berkeley is an emphasis within the Molecular and Cell Biology major, housed in the College of Letters and Science. For a detailed understanding of distinctions between Chemical Biology and Molecular & Cell Biology, review and compare upper-division course requirements and descriptions for both majors.

Transfer applicants are expected to complete, at a minimum, coursework equivalent to Berkeley's:

CHEMISTRY 1A + 1AL + 1B + 3A + 3AL + 3B + 3BL
MATH 1A + 1B + 53
PHYSICS 7A or 8A
ENGLISH R1A + R1B

Coursework must be completed by the end of the spring term that precedes fall enrollment at Berkeley.

IGETC is not required. Students who choose to complete the entire IGETC pattern by the end of the spring term preceding fall enrollment at Berkeley may use IGETC to fulfill the Reading and Composition and Language Other Than English (LOTE) Requirements.

Lower division courses required for graduation (but not for admission) are also listed in this articulation agreement. Completion of those courses is strongly recommended in order to strengthen one's application. All major courses must be taken for a letter grade. High grades in major courses (B and A grades exclusively) are essential for applicants to be both competitive in the admissions process and to be adequately prepared to continue with junior year coursework at Berkeley.

The applicant's personal statement is important in the admissions process. The personal statement is reviewed for evidence of the student's interest in the chosen field and a thoughtful match between the intended major and academic and career objectives.

For more information on College of Chemistry policies and degree programs:
https://chemistry.berkeley.edu/ugrad/degrees

For more information on admission to UC Berkeley:
https://admissions.berkeley.edu

For more information on majors at UC Berkeley:
Berkeley Academic Guide: http://guide.berkeley.edu

Additional questions about transferring to the College of Chemistry may be addressed to:
Maura Daly, Director of Undergraduate Student Services
mdaly@berkeley.edu
(510) 643-0550

ADDITIONAL REQUIREMENTS

Chemical Biology majors who transfer without having covered analytical chemistry are required to take CHEM 105 after transfer.

ORGANIC CHEMISTRY
CHEM 12A + 12B (organic chemistry) are required for the Chemical Biology B.S. degree.

Completion of CHEM 3A + 3AL + 3B + 3BL combined with a score in the 75th percentile or higher on the American Chemical Society (ACS) Organic Chemistry Exam will constitute satisfactory completion of Berkeley's CHEM 12A + 12B. Students are encouraged to take the exam through their community college, if possible.
NOTE: The College of Chemistry does not accept results from the 1994 and 1998 versions of the ACS Organic Chemistry Exam.

PHYSICS
PHYSICS 7C is not required for the Chemical Biology major, but it is acceptable toward the 7-Unit Upper Division Chemistry and

Allied Subjects Requirement.

READING AND COMPOSITION REQUIREMENT
Coursework equivalent to Berkeley's: English R1A + R1B; or
Entire IGETC pattern completed **by the end of the spring term preceding fall enrollment at Berkeley.**

You may also satisfy this requirement with a score/grade of:
4 or 5 on the AP exam in English Language and Composition satisfies ENGLISH R1A;
4 on the AP exam in English Literature and Composition satisfies ENGLISH R1A;
5 on the AP exam in English Literature and Composition satisfies ENGLISH R1A + R1B.

LANGUAGE OTHER THAN ENGLISH (LOTE) REQUIREMENT
The LOTE may be satisfied after transfer, but it should be satisfied by the end of the student's third (junior) year.

To satisfy this Requirement:

Complete a course equivalent to the third year of a language other than English in high school with a grade of C- or higher, or the second semester of a language other than English as taught at Berkeley; or

Complete the entire IGETC pattern by the end of the spring term preceding fall enrollment at Berkeley; or

You may satisfy this Requirement with a score/grade of:
550 on the SAT Subject Test, Language Other Than English, if taken before May 1995;
590 on the SAT II Subject Exam, if taken May 1995 or later;
3 or better on the Foreign Language AP Exam;
C or better on the GCE A-level or I/GCSE O-level Exam in a language other than English;
1-5 on the Foreign Service Institute (FSI) or Defense Language Institute (DLI) exam;
5 or better on the International Baccalaureate in the following exams:

Language (*other than English*) acquisition:
B Standard Level (SL)
B Higher Level (HL)

Studies in language (*other than English*) and literature:
A: literature Standard Level (SL)
A: literature Higher Level (HL)
A: language and literature Standard Level (SL)
A: language and literature Higher Level (HL)

OR

Courses that satisfy Language Other Than English requirement - See list of approved (FL-Foreign Language) courses below.
(May be taken for a letter grade or pass/no pass.)

AP EXAM CREDIT

BIOLOGY
You may also satisfy this requirement with a score/grade of:
4 or higher on the AP Biology exam.

MATHEMATICS
You may also satisfy this requirement with a score/grade of:
3 or higher on the AP Calculus AB exam satisfies MATH 1A;
3 or 4 on the AP Calculus BC exam satisfies MATH 1A;
5 on the AP Calculus BC exam satisfies MATH 1A + 1B.

LANGUAGE OTHER THAN ENGLISH (LOTE) REQUIREMENT
3 or better on the Foreign Language AP Exam

READING AND COMPOSITION REQUIREMENT
You may also satisfy this requirement with a score/grade of:
4 or 5 on the AP exam in English Language and Composition satisfies ENGLISH R1A;
4 on the AP exam in English Literature and Composition satisfies ENGLISH R1A;
5 on the AP exam in English Literature and Composition satisfies ENGLISH R1A + R1B.

See ADDITIONAL REQUIREMENTS section for additional options to satisfy requirements.

CHEMISTRY

****REFER TO TOP OF AGREEMENT****

CHEM 1A - General Chemistry (3.00) **--- And ---** **CHEM 1AL** - General Chemistry Laboratory (2.00)	←	**CHEM 1A** - General Chemistry (5.00) **--- And ---** **CHEM 1B** - General Chemistry (5.00)
CHEM 1B - General Chemistry (4.00)	←	**CHEM 1B** - General Chemistry (5.00) **--- And ---** **CHEM 1C** - General Chemistry & Qualitative Analysis (5.00)
CHEM 1A - General Chemistry (3.00) **--- And ---** **CHEM 1AL** - General Chemistry Laboratory (2.00) **--- And ---** **CHEM 1B** - General Chemistry (4.00)	←	Articulates as Course-to-Course Only

ORGANIC CHEMISTRY

****REFER TO TOP OF AGREEMENT****

CHEM 3A - Chemical Structure and Reactivity (3.00) **--- And ---** **CHEM 3AL** - Organic Chemistry Laboratory (2.00)	←	**CHEM 12A** - Organic Chemistry (4.00) **--- And ---** **CHEM 12AL** - Organic Chemistry Laboratory (2.00) **--- And ---** **CHEM 12B** - Organic Chemistry (4.00) **--- And ---** **CHEM 12BL** - Organic Chemistry Laboratory (2.00)
CHEM 3B - Chemical Structure and Reactivity (3.00) **--- And ---** **CHEM 3BL** - Organic Chemistry Laboratory (2.00)	←	**CHEM 12B** - Organic Chemistry (4.00) **--- And ---** **CHEM 12BL** - Organic Chemistry Laboratory (2.00) **--- And ---** **CHEM 12C** - Organic Chemistry (4.00) **--- And ---** **CHEM 12CL** - Organic Chemistry Laboratory (2.00)
CHEM 3A - Chemical Structure and Reactivity (3.00) **--- And ---** **CHEM 3AL** - Organic Chemistry Laboratory (2.00) **--- And ---** **CHEM 3B** - Chemical Structure and Reactivity (3.00) **--- And ---** **CHEM 3BL** - Organic Chemistry Laboratory (2.00)	←	No Course Articulated

MATHEMATICS

****REFER TO TOP OF AGREEMENT****

MATH 1A - Calculus (4.00)	←	**MATH 1A** - Calculus (5.00) **--- Or ---** **MATH 1AH** - Honors Calculus I (5.00)
MATH 1B - Calculus (4.00)	←	**MATH 1B** - Calculus (5.00) **--- And ---** **MATH 1C** - Calculus (5.00)

MATH 53 - Multivariable Calculus (4.00)	←	**MATH 1C** - Calculus (5.00) **--- And ---** **MATH 1D** - Calculus (5.00)
MATH 54 - Linear Algebra and Differential Equations (4.00)	←	**MATH 2A** - Differential Equations (5.00) **--- And ---** **MATH 2B** - Linear Algebra (5.00)

PHYSICS

****REFER TO TOP OF AGREEMENT****

PHYSICS 7A - Physics for Scientists and Engineers (4.00)	←	**PHYS 4A** - General Physics (Calculus) (6.00)
PHYSICS 7B - Physics for Scientists and Engineers (4.00)	←	**PHYS 4B** - General Physics (Calculus) (6.00) **--- And ---** **PHYS 4C** - General Physics (Calculus) (6.00)
PHYSICS 7C - Physics for Scientists and Engineers (4.00)	←	**PHYS 4C** - General Physics (Calculus) (6.00) **--- And ---** **PHYS 4D** - General Physics (Calculus) (6.00)
PHYSICS 7A - Physics for Scientists and Engineers (4.00) **--- And ---** **PHYSICS 7B** - Physics for Scientists and Engineers (4.00)	←	Articulates as Course-to-Course Only

PHYSICS 7A - Physics for Scientists and Engineers (4.00) **--- And ---** **PHYSICS 7B** - Physics for Scientists and Engineers (4.00) **--- And ---** **PHYSICS 7C** - Physics for Scientists and Engineers (4.00)	←	Articulates as Course-to-Course Only
--- Or ---		
PHYSICS 8A - Introductory Physics (4.00)	←	**PHYS 4A** - General Physics (Calculus) (6.00) **--- And ---** **PHYS 4B** - General Physics (Calculus) (6.00) **--- Or ---** **PHYS 2A** - General Physics (5.00) **--- And ---** **PHYS 2AM** - General Physics: Calculus Supplement (1.00) **--- And ---** **PHYS 2B** - General Physics (5.00) **--- And ---** **PHYS 2BM** - General Physics: Calculus Supplement (1.00)

PHYSICS 8B - Introductory Physics (4.00)	←	**PHYS 4B** - General Physics (Calculus) (6.00) **--- And ---** **PHYS 4C** - General Physics (Calculus) (6.00) **--- Or ---** **PHYS 2B** - General Physics (5.00) **--- And ---** **PHYS 2BM** - General Physics: Calculus Supplement (1.00) **--- And ---** **PHYS 2C** - General Physics (5.00) **--- And ---** **PHYS 2CM** - General Physics: Calculus Supplement (1.00)
PHYSICS 8A - Introductory Physics (4.00) **--- And ---** **PHYSICS 8B** - Introductory Physics (4.00)	←	Articulates as Course-to-Course Only

BIOLOGY

****REFER TO TOP OF AGREEMENT****

BIOLOGY 1A - General Biology Lecture (Cells, Genetics, Animal Form & Function) (3.00) **--- And ---** **BIOLOGY 1AL** - General Biology Laboratory (2.00)	←	**BIOL 1A** - Principles of Cell Biology (6.00) **--- And ---** **BIOL 1B** - Form & Function in Plants & Animals (6.00)
BIOLOGY 1A - General Biology Lecture (Cells, Genetics, Animal Form & Function) (3.00) **--- And ---** **BIOLOGY 1AL** - General Biology Laboratory (2.00) **--- And ---** **BIOLOGY 1B** - General Biology (Plant Form & Function, Ecology, Evolution) (4.00)	←	Articulates as Course-to-Course Only

READING AND COMPOSITION (R&C)

****REFER TO TOP OF AGREEMENT****

ENGLISH R1A - Reading and Composition (4.00)	←	**ENGL 1A** - Composition & Reading (5.00) **--- And ---** **ENGL 1B** - Composition, Critical Reading & Thinking Through Literature (5.00) **--- Or ---** **ENGL 1AH** - Honors Composition & Reading (5.00) **--- And ---** **ENGL 1BH** - Honors Composition, Critical Reading, & Thinking Through Literature (5.00)

ENGLISH R1B - Reading and Composition (4.00)	←	**ENGL 1B** - Composition, Critical Reading & Thinking Through Literature (5.00) **--- And ---** **ENGL 1C** - ARGUMENTATIVE WRITING & CRITICAL THINKING (5.00) **--- Or ---** **ENGL 1BH** - Honors Composition, Critical Reading, & Thinking Through Literature (5.00) **--- And ---** **ENGL 1CH** - HONORS ARGUMENTATIVE WRITING & CRITICAL THINKING (5.00)

LANGUAGE OTHER THAN ENGLISH

****REFER TO TOP OF AGREEMENT****

FL-Foreign Language	←	**JAPN 3** - Elementary Japanese III (5.00) **SPAN 3** - Elementary Spanish III (5.00)

END OF AGREEMENT

Articulation Agreement by Major

Effective during the 2020-2021 Academic Year

To: University of California, Davis	From: Foothill College
2020-2021 General Catalog, Quarter	2020-2021 General Catalog, Quarter

Biochemistry & Molecular Biology B.S.

INFORMATION AND ADVISORIES

Special Advising Note:

Transfer students are strongly advised to complete as many preparatory courses as possible for their major before enrolling at UC Davis. Preparing well for the major helps students move efficiently toward graduation and significantly reduces time to degree.

Transfer students also must meet UC transfer admission requirements. UC Davis requires that students complete the minimum transfer admission requirements by the end of Spring term prior to Fall enrollment. See the UC Transfer Admission webpage. In order to receive priority consideration it is strongly recommended that transfer students complete UC transfer admission requirements in English and Mathematics by the end of Fall term prior to enrollment.

REQUIREMENTS FOR ADMISSION:

The Biochemistry and Molecular Biology major is selective and require preparatory coursework for admission. Any required courses that are offered at your current campus must be completed by the close of Spring term prior to Fall enrollment at UC Davis. If required courses are not offered at your college, you must complete them after enrolling at UC Davis.

Transfer students must earn an overall transfer GPA of 2.80 or higher to be competitive candidates for admission to this major. Candidates must complete courses comparable to the following UC Davis courses with a GPA of at least 2.50 for each of the three course groups. It is recommended that candidates have already achieved the minimum required GPAs for the courses in the groups below that have been completed by the time of application and maintain them through the transfer academic update filing period. Courses must be taken for a letter grade, with no grade less than C. (Advanced Placement (AP) or International Baccalaureate (IB) Higher Level examinations may satisfy UC Davis course equivalents).

-Biological Sciences 2A/B/C (if only one Biological Science course is completed at the time of TAG, you must have a B- or higher)
-Chemistry 2A/B/C
-Mathematics 17A/B/C or 21A/B

It is also recommended that transfer students complete courses comparable to the following UC Davis courses. Completion of these courses will help you move more efficiently toward graduation. Courses should be taken for a letter grade, with no grade less than C:

-Organic Chemistry 118A/B/C
-Physics 7A/B/C

Transfer Admission Guarantee (TAG) Note:

GPA and other requirements to obtain a UC Davis TAG may differ from those stated here for general transfer admission to the major. Visit http://tag.ucdavis.edu for details regarding UC Davis TAG.

Intersegmental General Education Transfer Curriculum (IGETC)/UC Davis General Education (GE) Note:

Students have two choices for selection of a GE pattern: IGETC or UC Davis GE. IGETC is available only at California Community Colleges and works well for students planning to complete undergraduate degrees at UC Davis. See additional details about IGETC in ASSIST. UC Davis accepts partial IGETC certification and IGETC for STEM. Students not planning to complete IGETC should see important information about the UC Davis GE pattern. Students not planning to complete IGETC should contact the Dean's Office of your undergraduate college at UC Davis who determines whether you have satisfied the GE requirement. See a UC Davis academic advisor to understand how to complete all of the GE components.

College Foreign Language Requirement Note:

Transfer students pursuing this major who do not certify IGETC must complete a college graduation requirement in a foreign language. See https://ucdlc.ucdavis.edu/ and check with your UC Davis College Dean's Office or the Biology Academic Success Center for more information.

Advanced Placement (AP) and International Baccalaureate (IB) Examination Note:

AP and IB examination credit policies are detailed in the UC Davis General Catalog. Quick reference charts for AP and IB are also available here.

MAJOR PREPARATION

- **Please carefully review Information and Advisories and Course Articulation Details.**

COURSE ARTICULATION DETAILS

- **It is highly recommended that students complete an entire Physics series at their Community College that is equivalent to the entire UC Davis Physics 7A/B/C series before transferring. Students who transfer without completing an entire series may be required to take additional Physics courses upon arrival at UC Davis and will need to meet with a UC Davis advisor before continuing with Physics.**
- **Important note: Due to the limitations and bugs on the ASSIST platform at this time, it is important to view both the department and major agreements for a complete picture of the articulation arrangements. *Please refer to the appropriate department agreements in conjunction with the major agreement below.***
- **Attention: Articulation agreements are California Community College *specific*. Lower division courses that are taken at multiple California Community Colleges may articulate differently from what is indicated in the department or major agreements. It is recommended that series courses be completed at the same California Community College. Please contact your California Community College advisor for more information.**

PREPARATION COURSES FOR THE MAJOR

Highly recommended to complete the entire series
If the entire sequence is not completed prior to transfer, students must consult the department advisor prior to enrollment

BIOLSCI 002A - Introduction to Biology: Essentials of Life on Earth (5.00)	←	**BIOL 1A** - Principles of Cell Biology (6.00)
BIOLSCI 002B - Introduction to Biology: Principles of Ecology & Evolution (5.00)	←	**BIOL 1B** - Form & Function in Plants & Animals (6.00) **--- And ---** **BIOL 1C** - Evolution, Systematics & Ecology (6.00)
BIOLSCI 002C - Introduction to Biology: Biodiversity & the Tree of Life (5.00)	←	**BIOL 1B** - Form & Function in Plants & Animals (6.00) **--- And ---** **BIOL 1C** - Evolution, Systematics & Ecology (6.00)

Select 1 Series from the following

Highly recommended to complete the entire series
If the entire sequence is not completed prior to transfer, students must consult the department advisor prior to enrollment
Select courses in consultation with an advisor

CHEM 002A - General Chemistry (5.00)	←	**CHEM 1A** - General Chemistry (5.00)
CHEM 002B - General Chemistry (5.00)	←	**CHEM 1B** - General Chemistry (5.00)
CHEM 002C - General Chemistry (5.00)	←	**CHEM 1C** - General Chemistry & Qualitative Analysis (5.00)

--- Or ---

CHEM 002AH - Honors General Chemistry (5.00)	←	No Course Articulated
CHEM 002BH - Honors General Chemistry (5.00)	←	No Course Articulated
CHEM 002CH - Honors General Chemistry (5.00)	←	No Course Articulated

--- Or ---

CHEM 003A - Chemistry for Life Sciences: Determining Structure & Predicting Properties (5.00)	←	No Course Articulated
CHEM 003B - Chemistry for Life Sciences: Predicting & Characterizing Chemical Change (5.00)	←	No Course Articulated
CHEM 003C - Chemistry for Life Sciences: Controlling Processes & Synthetic Pathways (5.00)	←	No Course Articulated

Select 1 Series from the following

Highly recommended to complete the entire series
If the entire sequence is not completed prior to transfer, students must consult the department advisor prior to enrollment

Select courses in consultation with an advisor

CHEM 118A - Organic Chemistry for Health & Life Sciences (4.00)	←	**CHEM 12A** - Organic Chemistry (4.00) • *Articulation applies to one series only, or one series plus labs*
CHEM 118B - Organic Chemistry for Health & Life Sciences (4.00)	←	**CHEM 12B** - Organic Chemistry (4.00) • *Articulation applies to one series only, or one series plus labs*
CHEM 118C - Organic Chemistry for Health & Life Sciences (4.00)	←	**CHEM 12C** - Organic Chemistry (4.00) • *Articulation applies to one series only, or one series plus labs*

--- Or ---

CHEM 128A - Organic Chemistry (3.00)	←	**CHEM 12A** - Organic Chemistry (4.00) • *Articulation applies to one series only, or one series plus labs*
CHEM 128B - Organic Chemistry (3.00)	←	**CHEM 12B** - Organic Chemistry (4.00) • *Articulation applies to one series only, or one series plus labs*
CHEM 128C - Organic Chemistry (3.00)	←	**CHEM 12C** - Organic Chemistry (4.00) • *Articulation applies to one series only, or one series plus labs*
CHEM 129A - Organic Chemistry Laboratory (2.00)	←	**CHEM 12A** - Organic Chemistry (4.00) • *Articulation applies to one series only, or one series plus labs*
CHEM 129B - Organic Chemistry Laboratory (2.00)	←	**CHEM 12B** - Organic Chemistry (4.00) • *Articulation applies to one series only, or one series plus labs*

Select 1 Series from the following

Highly recommended to complete the entire series
If the entire sequence is not completed prior to transfer, students must consult the department advisor prior to enrollment
Select courses in consultation with an advisor

MATH 017A - Calculus for Biology & Medicine (4.00)	←	No Course Articulated
MATH 017B - Calculus for Biology & Medicine (4.00)	←	No Course Articulated
MATH 017C - Calculus for Biology & Medicine (4.00)	←	No Course Articulated

--- Or ---

MATH 021A - Calculus (4.00)	←	**MATH 1A** - Calculus (5.00) **--- Or ---** **MATH 1AH** - Honors Calculus I (5.00) **--- And ---** **MATH 1AHP** - Honors Calculus I Seminar (1.00)
MATH 021B - Calculus (4.00)	←	**MATH 1B** - Calculus (5.00)
MATH 021C - Calculus (4.00) • *Recommended; Not required for the major*	←	**MATH 1C** - Calculus (5.00)

Select 1 Series from the following

Highly recommended to complete the entire series
If the entire sequence is not completed prior to transfer, students must consult the department advisor prior to enrollment
Select courses in consultation with an advisor

PHYSICS 007A - General Physics (4.00)	←	**PHYS 2A** - General Physics (5.00) **--- And ---** **PHYS 2B** - General Physics (5.00) **--- And ---** **PHYS 2C** - General Physics (5.00)
PHYSICS 007B - General Physics (4.00)	←	**PHYS 2A** - General Physics (5.00) **--- And ---** **PHYS 2B** - General Physics (5.00) **--- And ---** **PHYS 2C** - General Physics (5.00)
PHYSICS 007C - General Physics (4.00)	←	**PHYS 2A** - General Physics (5.00) **--- And ---** **PHYS 2B** - General Physics (5.00) **--- And ---** **PHYS 2C** - General Physics (5.00)

--- Or ---

PHYSICS 009A - Classical Physics (5.00)	←	**PHYS 4A** - General Physics (Calculus) (6.00)
PHYSICS 009B - Classical Physics (5.00)	←	**PHYS 4C** - General Physics (Calculus) (6.00)
PHYSICS 009C - Classical Physics (5.00)	←	**PHYS 4B** - General Physics (Calculus) (6.00)

END OF AGREEMENT

Articulation Agreement by Major

Effective during the 2020-2021 Academic Year

To: University of California, Santa Cruz 2020-2021 General Catalog, Quarter	From: Foothill College 2020-2021 General Catalog, Quarter

Chemistry, Biochemistry Concentration B.S.

GENERAL INFORMATION FOR ALL MAJORS

All transfer applicants must satisfy University of California admissions eligibility requirements as well as meeting campus selection criteria. All admission requirements must be completed by the end of spring prior to transfer. For more information on UC admissions eligibility requirements and admission to UC Santa Cruz, please visit the Admissions website: https://admissions.ucsc.edu/apply/transfer-students/preparing.html.

This articulation agreement lists course-to-course, sequence-to-sequence or requirement substitutions for preparation in the major. **Transfer students are strongly encouraged to complete as many major preparatory courses as possible prior to enrolling at UCSC. Completion of all major preparatory courses is not an admissions requirement, but some majors require certain courses to be completed prior to transfer with a specified GPA, and completion or near completion of major preparatory courses will help students move more efficiently toward graduation after transfer.**

UC Santa Cruz Advanced Placement (AP) and International Baccalaureate (IB) credit policies are detailed in the link below:

https://admissions.ucsc.edu/publications/ap-ib-chart.pdf

CHEMISTRY, BIOCHEMISTRY CONCENTRATION B.S.

Please visit the department's website to learn more about this major: https://www.chemistry.ucsc.edu

The biochemistry concentration is designed for students who intend to pursue a career in biochemistry or in a related field such as biotechnology, and it provides an especially rigorous chemistry emphasis.

ADMISSION SELECTION CRITERIA

To be considered for admission to the Chemistry B.S. major, transfer students must pass equivalents of the following courses with a cumulative GPA of 2.50 or higher:

CHEM 1A: General Chemistry

CHEM 1B/M: General Chemistry and General Chemistry Laboratory

CHEM 1C/N: General Chemistry and General Chemistry Laboratory

MATH 22: Introduction to Calculus of Several Variables

Plus one of the following options:

MATH 11A: Calculus with Applications **AND** MATH 11B: Calculus with Applications

OR

MATH 19A: Calculus for Science, Engineering, and Mathematics **AND** MATH 19B: Calculus for Science, Engineering, and Mathematics

In addition to the courses required for transfer admission, the following courses are strongly recommended prior to transfer to ensure timely graduation:

CHEM 8A/8L: Organic Chemistry and Organic Chemistry Laboratory

CHEM 8B/8M: Organic Chemistry and Organic Chemistry Laboratory

PHYS 6A/6L: Introductory Physics I and Introductory Physics I Laboratory

PHYS 6B/6M: Introductory Physics II and Introductory Physics II Laboratory

Prospective students are encouraged to prioritize required and recommended major preparation, and may additionally complete courses that articulate to UC Santa Cruz general education requirements as time allows.

THIS IS A SCREENING MAJOR. For more information on screening major requirements please visit the Admissions website: https://admissions.ucsc.edu/apply/transfer-students/major-prep.html

MAJOR PREPARATION COURSES REQUIRED FOR TRANSFER

CHEM 1A - General Chemistry (5.00) **--- And ---** **CHEM 1B** - GENERAL CHEMISTRY (5.00) **--- And ---** **CHEM 1C** - GENERAL CHEMISTRY (5.00) **--- And ---** **CHEM 1M** - GENERAL CHEMISTRY LABORATORY (2.00) **--- And ---** **CHEM 1N** - General Chemistry Laboratory (2.00)	←	**CHEM 1A** - General Chemistry (5.00) **--- And ---** **CHEM 1B** - General Chemistry (5.00) **--- And ---** **CHEM 1C** - General Chemistry & Qualitative Analysis (5.00) **--- Or ---** **CHEM 1AH** - Honors General Chemistry (5.00) **--- And ---** **CHEM 1BH** - Honors General Chemistry (5.00) **--- And ---** **CHEM 1C** - General Chemistry & Qualitative Analysis (5.00)
MATH 22 - INTRODUCTION TO CALCULUS OF SEVERAL VARIABLES (5.00)	←	**MATH 1C** - Calculus (5.00) **--- And ---** **MATH 1D** - Calculus (5.00)

Select 1 Sequence(s) from the following

MATH 11A - CALCULUS WITH APPLICATIONS (5.00)	←	**MATH 1A** - Calculus (5.00)
--- And ---		
MATH 11B - CALCULUS WITH APPLICATIONS (5.00)	←	**MATH 1B** - Calculus (5.00)
--- Or ---		
MATH 19A - Calculus for Science, Engineering, and Mathematics (5.00)	←	**MATH 1A** - Calculus (5.00) **--- And ---** **MATH 1B** - Calculus (5.00)
--- And ---		
MATH 19B - Calculus for Science, Engineering, and Mathematics (5.00)	←	**MATH 1B** - Calculus (5.00) **--- And ---** **MATH 1C** - Calculus (5.00)

STRONGLY RECOMMENDED ADVANCED PREPARATION COURSES

CHEM 8A - Organic Chemistry (5.00)	←	**CHEM 12A** - Organic Chemistry (4.00) **--- And ---** **CHEM 12B** - Organic Chemistry (4.00)
--- And ---		
CHEM 8L - Organic Chemistry Laboratory (2.00)	←	**CHEM 12AL** - Organic Chemistry Laboratory (2.00) **--- And ---** **CHEM 12BL** - Organic Chemistry Laboratory (2.00) **--- Or ---** **CHEM 13AH** - Honors Organic Chemistry Laboratory (3.00) **--- And ---** **CHEM 13BH** - Honors Organic Chemistry Laboratory (3.00)

CHEM 8B - Organic Chemistry (5.00) ← **CHEM 12B** - Organic Chemistry (4.00)
--- And ---
CHEM 12C - Organic Chemistry (4.00)

--- And ---

CHEM 8M - Organic Chemistry Laboratory (2.00) ← **CHEM 12BL** - Organic Chemistry Laboratory (2.00)
--- And ---
CHEM 12CL - Organic Chemistry Laboratory (2.00)
--- Or ---
CHEM 13BH - Honors Organic Chemistry Laboratory (3.00)
--- And ---
CHEM 13CH - Honors Organic Chemistry Laboratory (3.00)

PHYS 6A - Introductory Physics I (5.00) ← **PHYS 4A** - General Physics (Calculus) (6.00)
--- Or ---
PHYS 2A - General Physics (5.00)
--- And ---
PHYS 2AM - General Physics: Calculus Supplement (1.00)

--- And ---

PHYS 6L - Introductory Physics I Laboratory (1.00) ← **PHYS 4A** - General Physics (Calculus) (6.00)
--- Or ---
PHYS 2A - General Physics (5.00)
--- And ---
PHYS 2AM - General Physics: Calculus Supplement (1.00)

PHYS 6B - INTRODUCTORY PHYSICS II (5.00) ← **PHYS 4C** - General Physics (Calculus) (6.00)
--- Or ---
PHYS 2B - General Physics (5.00)
--- And ---
PHYS 2BM - General Physics: Calculus Supplement (1.00)
--- And ---
PHYS 2C - General Physics (5.00)
--- And ---
PHYS 2CM - General Physics: Calculus Supplement (1.00)

--- And ---

PHYS 6M - INTRODUCTORY PHYSICS II LABORATORY (1.00) ← **PHYS 4C** - General Physics (Calculus) (6.00)
--- Or ---
PHYS 2B - General Physics (5.00)
--- And ---
PHYS 2BM - General Physics: Calculus Supplement (1.00)
--- And ---
PHYS 2C - General Physics (5.00)
--- And ---
PHYS 2CM - General Physics: Calculus Supplement (1.00)

ADDITIONAL MAJOR PREPARATION COURSES

BIOL 20A - CELL AND MOLECULAR BIOLOGY (5.00) ← **BIOL 1A** - Principles of Cell Biology (6.00)

BIOE 20B - Development and Physiology (5.00)	←	**BIOL 1B** - Form & Function in Plants & Animals (6.00)

PHYS 6C - INTRODUCTORY PHYSICS III (5.00)	←	**PHYS 4B** - General Physics (Calculus) (6.00) **--- Or ---** **PHYS 2B** - General Physics (5.00) **--- And ---** **PHYS 2BM** - General Physics: Calculus Supplement (1.00)
--- And ---		
PHYS 6N - INTRODUCTORY PHYSICS III LABORATORY (1.00)	←	**PHYS 4B** - General Physics (Calculus) (6.00) **--- Or ---** **PHYS 2B** - General Physics (5.00) **--- And ---** **PHYS 2BM** - General Physics: Calculus Supplement (1.00)

Select 1 Course(s) from the following

AM 10 - Mathematical Methods for Engineers I (5.00)	←	**MATH 2B** - Linear Algebra (5.00)
--- Or ---		
MATH 21 - LINEAR ALGEBRA (5.00)	←	**MATH 2B** - Linear Algebra (5.00)
--- Or ---		
MATH 24 - ORDINARY DIFFERENTIAL EQUATIONS (5.00)	←	**MATH 2A** - Differential Equations (5.00)

END OF AGREEMENT

FOOTHILL COLLEGE
Temporary Program Creation Process
Feedback Form for New Programs

Until the new permanent program creation process has been determined, as part of the temporary program creation process this form shall be used by a department to gather feedback on a new program from key governance committees on campus. A complete program narrative and supporting documentation must be submitted to the groups listed below (simultaneous submission is recommended). Each committee will provide initial feedback via email within two weeks but might also provide additional feedback after their monthly meetings.

After a two-week period, regardless of whether feedback has been received from the three committees, the Division Curriculum Committee may consider the new program for approval. Following Division CC approval, please forward this completed form to the Office of Instruction.

Faculty Author(s): Ron Painter
Division: STEM

Program Title: Biochemistry (AS)
Program Units: 60-62

Workforce/CTE Program (Y/N): N
Please note that Workforce/CTE status is dependent on the TOP Code assigned to the program.

Type of Award:
_____ Non-transcriptable credit certificate
_____ Certificate of Achievement
_____ Noncredit certificate
__X_ AA/AS Degree (local)
_____ AA-T/AS-T Degree (ADT)

EQUITY & EDUCATION https://foothill.edu/gov/equity-and-education/
Date of meeting: **Comments:** Submitted to Equity & Education committee on April 27, 2021. No feedback given.

REVENUE & RESOURCES https://foothill.edu/gov/revenue-and-resources/
Date of meeting: through email – 4/28–5/5 response time **Comments:** No questions or comments

ADVISORY COUNCIL https://foothill.edu/gov/council/
Date of meeting: **Comments:** Submitted to Advisory Council on April 27, 2021. No feedback given.

Division Curriculum Committee Approval Date: 4/27/21

Division CC Representative: Zach Cembellin

Foothill College
Credit Program Narrative
Certificate of Achievement in Data Analytics

Item 1. Program Goals and Objectives

The goal of the Certificate of Achievement in Data Analytics is to offer practical training in the most essential skills and tools used by businesses and organizations to analyze data to find actionable insights, and drive data-based decisions to increase business success. The demand for data professionals—who are fluent in the latest data analytics techniques and methods combined with the business acumen needed to apply their skills strategically in today's business environment—has never been greater and promises to be a rich source of career opportunity for the foreseeable future. With a strong focus on students from diverse populations, this certificate will provide individuals with an opportunity to benefit from the strong growth in data analytics job positions that require the skills offered by this certificate.

Program Learning Outcomes:

- Upon completion of the program, the student will have acquired the necessary basic skills to conduct data analytics projects in a typical business environment.
- Upon completion of the program, the student will be able to demonstrate appropriate critical thinking, problem-solving skills and communication skills to contribute to effective data analytics in a business organization.

Item 2. Catalog Description

Created in collaboration with Silicon Valley Bank and Tableau, the Certificate of Achievement in Data Analytics is designed for people who are seeking to gain real-world experience in data analytics in pursuit of a career as a data professional. The program provides 23 units of instruction and hands-on practice in understanding data needs of a business; acquiring, cleaning, storing, sorting, visualizing, analyzing, and presenting data; and positively impacting business outcomes through data analytics.

Item 3. Program Requirements

Requirements	Course #	Name	Units	Sequence
Core Courses (23 units)	BUSI 11	Introduction to Information Systems	5	Fall, Year 1
	BUSI 12	Introduction to Data Analytics & Business Decisions	4	Winter, Year 1
	C S 31A	Introduction to Database Management Systems	4.5	Spring, Year 1
	C S 48A	Data Visualization	4.5	Spring, Year 1
	MATH 10	Elementary Statistics	5	Fall, Year 2

TOTAL UNITS: 23 units

Proposed Sequence:
Year 1, Fall = 5 units
Year 1, Winter = 4 units
Year 1, Spring = 9 units
Year 2, Fall = 5 units
TOTAL UNITS: 23 units

Item 4. Master Planning

Foothill College offers programs and services that empower students to achieve their goals as members of the workforce, as future students, and as global citizens. There is currently a high demand for qualified individuals who understand data analytics and can utilize them to benefit an organization.

This innovative program will allow students to achieve their goals, whether it is to promote their business, advance in place of employment or transfer credit to a four-year college. The Certificate of Achievement in Data Analytics is also a pivotal step for students who are retraining, returning to workplace and/or updating marketing skills.

Item 5. Enrollment and Completer Projections

On average, BUSI 11, C S 31A, and MATH 10 have been offered consistently for the past 4 years (2016-2020), with consistent enrollment in all classes over the same period of time. While BUSI 12 and C S 48A have only been offered starting Winter 2020, initial student interest is extremely high for both of these courses. Due to high demand for data analytics skills in the marketplace, as well as the highly visible partnership with Tableau and Silicon Valley Bank, we are confident that enrollment will grow for all courses in the certificate. Also, the relatively compact nature of the certificate will be extremely attractive to individuals who wish to employ the newly acquired skills in their current roles. Further, because all of the courses can be taught completely online, if needed, it is anticipated that international participation over the next five years will significantly increase the number of students who complete this certificate.

		2017-18		2018-19		2019-20	
Course #	Course Title	Annual Sections	Annual Enrollment	Annual Sections	Annual Enrollment	Annual Sections	Annual Enrollment
BUSI 11	Intro to Info Systems	9	357	8	349	7	302
BUSI 12	Intro to Data Analytics & Business Decisions	NA	NA	NA	NA	2	62
CS 31A	Intro to Database Management Systems	3	94	3	89	3	106
CS 48A	Data Visualization	NA	NA	NA	NA	1	38
MATH 10	Introduction to Information Systems	36	1861	54	2201	60	2178

Item 6. Place of Program in Curriculum/Similar Programs

Foothill College currently offers all courses necessary to complete the Certificate of Achievement in Data Analytics. Students will be able to complete the coursework as early as Spring 2021. The new transcriptable certificate will be available to students as soon as it is approved.

Item 7. Similar Programs at Other Colleges in Service Area

There is one community college in the Bay Region issuing two awards on average annually (last three years, ending 2018-19) on TOP 0509.70 - E-Commerce (business emphasis). In the Silicon Valley Sub-Region, there are no community colleges that issued awards on average annually (last three years) in this TOP code.

The Foothill collaboration with Tableau and Silicon Valley Bank provides significant differentiation for our Data Analytics certificate from any competitor. Additionally, the Foothill certificate focuses on practical application data analytics skills.

Additional Information Required for State Submission:

TOP Code: 0509.70 - E-Commerce (business emphasis): Programs that combine marketing and management principles with technical applications of the Internet and World Wide Web, with main emphasis on business principles.

Annual Completers: 40

Net Annual Labor Demand: 10,290 (Bay Region)

Faculty Workload: .6 annual load or 60% of one FTEF

New Faculty Positions: None, our existing full-time and adjunct faculty will teach the courses

New Equipment: $0

New/Remodeled Facilities: $0

Library Acquisitions: $0

Gainful Employment: Yes

Program Review Date: December 2021

Distance Education: 50-99%

Data Analytics Occupations
Labor Market Information Report
Foothill College

Prepared by the San Francisco Bay Center of Excellence for Labor Market Research

May 2021

Recommendation

Based on all available data, there appears to be an "undersupply" of Data Analytics workers compared to the demand for this cluster of occupations in the Bay region and in the Silicon Valley sub-region (Santa Clara county). There is a projected annual gap of about 306 students in the Bay region and 93 students in the Silicon Valley Sub-Region.

Introduction

This report provides student outcomes data on employment and earnings for TOP 0509.70 - E-Commerce (business emphasis) programs in the state and region. It is recommended that these data be reviewed to better understand how outcomes for students taking courses on this TOP code compare to potentially similar programs at colleges in the state and region, as well as to outcomes across all CTE programs at Foothill College and in the region.

This report profiles Data Analytics Occupations in the 12 county Bay region and in the Silicon Valley sub-region for a proposed new program at Foothill College.

- **Operations Research Analysts (15-2031):** Formulate and apply mathematical modeling and other optimizing methods to develop and interpret information that assists management with decision making, policy formulation, or other managerial functions. May collect and analyze data and develop decision support software, service, or products. May develop and supply optimal time, cost, or logistics networks for program evaluation, review, or implementation.

  Entry-Level Educational Requirement: Bachelor's degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 21%

Occupational Demand

Table 1. Employment Outlook for Data Analytics Occupations in Bay Region

Occupation	2019 Jobs	2024 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Operations Research Analysts	3,421	3,702	280	8%	1,847	308	$ 39	$ 54
Total	**3,421**	**3,702**	**281**	**8%**	**1,847**	**308**	**$39**	**$54**

Source: EMSI 2021.2

Bay Region includes: Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma Counties

Table 2. Employment Outlook for Data Analytics Occupations in Silicon Valley Sub-region

Occupation	2019 Jobs	2024 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Operations Research Analysts	969	1,130	161	17%	556	93	$ 39	$ 57
Total	**969**	**1,130**	**161**	**17%**	**556**	**93**	**$39**	**$57**

Source: EMSI 2021.2
Silicon Valley Sub-Region includes: Santa Clara County

Job Postings in Bay Region and Silicon Valley Sub-Region

Table 3. Number of Job Postings by Occupation for latest 12 months (May 2020 - Apr 2021)

Occupation	Bay Region	Silicon Valley
Operations Research Analysts	10,290	2,777

Source: Burning Glass

Table 4a. Top Job Titles for Data Analytics Occupations for latest 12 months (May 2020 - Apr 2021) Bay Region

Title	Bay	Title	Bay
Research Assistant	174	Scientist II	65
Research Associate	159	Researcher	56
Operations Analyst	129	Operations Analyst III	46
Business Operations Analyst	123	Research Analyst	44
Business Development Director	102	Scientist I	41
Director, Business Development	83	Research Associate I	40
Research Scientist	73	Process Scientist III	37
Research Associate II	69	Research And Development Technician	35
Researcher III	68	Operations Analyst II	35

Source: Burning Glass

Table 4b. Top Job Titles for Data Analytics Occupations for latest 12 months (May 2020 - Apr 2021) Silicon Valley Sub-Region

Title	Silicon Valley	Title	Silicon Valley
Research Assistant	58	Researcher II	26
Business Operations Analyst	54	Director, Business Development	23
Operations Analyst	40	Research Associate	22
Researcher III	36	Applied Scientist	21
Operations Analyst III	34	Research And Development Technician	16
Operations Analyst II	34	Scientist II	12
Research Scientist	32	Senior Scientist	11
Researcher	31	Senior Operations Analyst	11
Business Development Director	29	Senior Applied Scientist	11

Source: Burning Glass

Industry Concentration

Table 5. Industries hiring Data Analytics Workers in Bay Region

Industry – 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2019)	Jobs in Industry (2024)	% Change (2019-24)	% Occupation Group in Industry (2019)
Custom Computer Programming Services	337	372	10%	9%
Corporate, Subsidiary, and Regional Managing Offices	270	236	-13%	7%
Internet Publishing and Broadcasting and Web Search Portals	235	270	15%	7%
Computer Systems Design Services	190	193	2%	5%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	123	176	44%	5%
Electronic Computer Manufacturing	41	165	298%	5%
Data Processing, Hosting, and Related Services	111	157	41%	4%
Software Publishers	115	144	25%	3%
Administrative Management and General Management Consulting Services	109	123	12%	3%
Research and Development in Biotechnology (except Nanobiotechnology)	76	125	64%	3%

Source: EMSI 2021.2

Table 6. Top Employers Posting Data Analytics Occupations in Bay Region and Silicon Valley Sub-Region (May 2020 - Apr 2021)

Employer	Bay	Employer	Silicon Valley
Facebook	329	Stanford University	146
University Of California	305	Apple Inc.	87
Genentech	273	Amazon	82
Thermo Fisher Scientific Inc	160	Danaher Corporation	63
Stanford University	158	Nvidia Corporation	40
Amazon	140	IBM	34
Day & Zimmermann Incorporated	128	Google Inc.	33
Danaher Corporation	88	Paypal	31
Apple Inc.	87	Cisco Systems Incorporated	29
Lawrence Berkeley National Laboratory	79	Samsung America, Inc.	28

Source: Burning Glass

Educational Supply

There is one (1) community college in the Bay Region issuing 2 awards on average annually (last 3 years ending 2018-19) on TOP 0509.70 - E-Commerce (business emphasis). In the Silicon Valley Sub-Region, there are no community colleges that issued awards on average annually (last 3 years) on this TOP code.

Table 7. Community College Awards on TOP 0509.70 - E-Commerce (business emphasis) in Bay Region

College	Subregion	Certificate Low	Total
Santa Rosa	North Bay	2	2
Total		**2**	**2**

Source: Data Mart

Note: The annual average for awards is 2016-17 to 2018-19.

Gap Analysis

Based on the data included in this report, there is a labor market gap in the Bay region with 308 annual openings for the Data Analytics occupational cluster and 2 annual (3-year average) awards for an annual undersupply of 306 students. In the Silicon Valley Sub-Region, there is also a gap with 93 annual openings and no annual (3-year average) awards for an annual undersupply of 93 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0509.70 - E-Commerce (business emphasis)

Metric Outcomes	Bay All CTE Program	Foothill All CTE Program	State 0509.70	Bay 0509.70	Silicon Valley 0509.70	Foothill 0509.70
Students with a Job Closely Related to Their Field of Study	75%	88%	55%	N/A	N/A	N/A
Median Annual Earnings for SWP Exiting Students	$44,575	$63,206	$31,043	$34,283	N/A	N/A
Median Change in Earnings for SWP Exiting Students	31%	63%	56%	41%	N/A	N/A
Exiting Students Who Attained the Living Wage	52%	67%	51%	N/A	N/A	N/A

Source: Launchboard Strong Workforce Program from version 2017-18.

Skills, Certifications and Education

Table 9. Top Skills for Data Analytics Occupations in Bay Region (May 2020 - Apr 2021)

Skill	Posting	Skill	Posting
Experiments	2,064	Chemistry	709
Data Analysis	1,701	Customer Service	680
Python	1,340	Scheduling	640
Molecular Biology	1,219	Data Science	632
Biology	1,216	Immunology	625
Project Management	1,215	Cancer knowledge	578
Biochemistry	1,147	Quality Assurance and Control	564
Business Development	1,100	Salesforce	547
Product Development	943	Cell Culturing	533
Machine Learning	933	Assay Development	532
Biotechnology	889	Business Operations	531
SQL	849	Cell Biology	531
Operations Analysis	844	Experimental Design	507
Budgeting	736	C++	504

Source: Burning Glass

Table 10. Certifications for Data Analytics Occupations in Bay Region (May 2020 - Apr 2021)

Certification	Posting	Certification	Posting
Driver's License	152	Certified Scrum Professional (CSP)	11
Security Clearance	71	Hazwoper	10
Project Management Certification	71	Clinical Laboratory Scientist (CIS)	9
Certified Animal Laboratory Technician	60	Certified Meeting Planner	9
Project Management Professional (PMP)	18	Laboratory Animal Technologist (LATG)	8

Certification	Posting	Certification	Posting
Series 7	16	Certified Protection Professional (CPP)	8
IT Infrastructure Library (ITIL) Certification	16	Certified Payroll Professional (CPP)	8
Certified Institutional Review Board (IRB) Professional	15	Series 63	7
Certified Information Systems Security Professional (CISSP)	12	SANS/GIAC Certification	7
Six Sigma Certification	11	Phlebotomy Certification	7

Source: Burning Glass
Note: 94% of records have been excluded because they do not include a certification. As a result, the chart below may not be representative of the full sample.

Table 11. Education Requirements for Data Analytics Occupations in Bay Region

Education (minimum advertised)	Latest 12 Mos. Postings	Percent 12 Mos. Postings
Associate's degree	262	3%
Bachelor's degree	5,539	67%
Master's degree	984	12%
Doctoral degree	1,497	18%

Source: Burning Glass

Methodology

Occupations for this report were identified by use of skills listed in O*Net descriptions and job descriptions in Burning Glass. Labor demand data is sourced from Economic Modeling Specialists International (EMSI) occupation data and Burning Glass job postings data. Educational supply and student outcomes data is retrieved from multiple sources, including CTE Launchboard and CCCCO Data Mart.

Sources

O*Net Online
Labor Insight/Jobs (Burning Glass)
Economic Modeling Specialists International (EMSI)
CTE LaunchBoard www.calpassplus.org/Launchboard/
Statewide CTE Outcomes Survey
Employment Development Department Unemployment Insurance Dataset
Living Insight Center for Community Economic Development
Chancellor's Office MIS system

Contacts

For more information, please contact:

• Leila Jamoosian, Research Analyst, for Bay Area Community College Consortium (BACCC) and Centers of Excellence (CoE), leila@baccc.net

• John Carrese, Director, San Francisco Bay Center of Excellence for Labor Market Research, jcarrese@ccsf.edu or (415) 267-6544

FOOTHILL COLLEGE
Temporary Program Creation Process
Feedback Form for New Programs

Until the new permanent program creation process has been determined, as part of the temporary program creation process this form shall be used by a department to gather feedback on a new program from key governance committees on campus. A complete program narrative and supporting documentation must be submitted to the groups listed below (simultaneous submission is recommended). Each committee will provide initial feedback via email within two weeks but might also provide additional feedback after their monthly meetings.

After a two-week period, regardless of whether feedback has been received from the three committees, the Division Curriculum Committee may consider the new program for approval. Following Division CC approval, please forward this completed form to the Office of Instruction.

Faculty Author(s): Laurence Lew
Division: BSS

Program Title: Data Analytics
Program Units: 23 Units

Workforce/CTE Program (Y/N): Y
Please note that Workforce/CTE status is dependent on the TOP Code assigned to the program.

Type of Award:
_____ Non-transcriptable credit certificate
__X_ Certificate of Achievement
_____ Noncredit certificate
_____ AA/AS Degree (local)
_____ AA-T/AS-T Degree (ADT)

EQUITY & EDUCATION https://foothill.edu/gov/equity-and-education/
Date of meeting: April 12, 2021 **Comments:** None

REVENUE & RESOURCES https://foothill.edu/gov/revenue-and-resources/
Date of meeting: April 12, 2021 **Comments:** None

ADVISORY COUNCIL https://foothill.edu/gov/council/
Date of meeting: April 12, 2021 **Comments:** None

Division Curriculum Committee Approval Date: April 26, 2021

Division CC Representative: Kas Pereira, Laurence Lew

FOOTHILL COLLEGE
College Curriculum Committee
Guided Pathways Program Map Approval Process

Background

Guided Pathways Program Maps are an essential tool for helping Foothill College students achieve their educational goals in a timely fashion. In order for effective development of Program Maps to occur, it is essential that the Guided Pathways Team, department faculty, and division dean work together to assure the viability of the Program Map. Because Program Maps are related to curriculum, the College Curriculum Committee is the most appropriate group for review and approval of finalized Maps.

Policy

The College Curriculum Committee hereby delegates the power to approve Guided Pathways Program Maps to the relevant Division Curriculum Committee.

Process

Faculty from the department and the division dean will work in collaboration with the Guided Pathways Team to create the Guided Pathways Program Map. The Program Map must then be submitted to the Division Curriculum Committee for approval. The approved Program Map shall then be submitted to the College Curriculum Committee as an information item.

If the Program Map includes substantial coursework from a department outside of the Division, the relevant Division Curriculum Committees shall engage in collegial consultation before approving the final Program Map.