College Curriculum Committee Meeting Agenda
Tuesday, June 10, 2025
2:00 p.m. – 3:30 p.m.
Administrative Conference Room 1901; virtual option via Zoom

Item	Time*	Action	Attachment(s)	Presenter(s)
1. Minutes: May 27, 2025	2:00	Action	#6/10/25-1	Kaupp
2. Report Out from CCC Members	2:02	Discussion		All
3. Public Comment on Items Not on Agenda (CCC cannot discuss or take action)	2:12	Information		
4. Announcements a. New Course Proposals b. CCC Meeting Dates for 2025-26	2:17	Information	 #6/10/25-2–14 #6/10/25-15	CCC Team
5. Consent Calendar a. Division Curriculum Committees	2:22	Action	 #6/10/25-16	Kaupp
6. Stand Alone Applications: EMS 60C, 61C, 62C	2:25	2nd Read/ Action	#6/10/25-17–20	Kaupp
7. Stand Alone Applications: NCAL 419J, 419K	2:28	2nd Read/ Action	#6/10/25-21–22	Kaupp
8. New Degree Application: Semiconductor Process Engineering AS	2:31	2nd Read/ Action	#6/10/25-23	Kaupp
9. New Certificate Application: Vacuum Technology	2:36	2nd Read/ Action	#6/10/25-24	Kaupp
10. New Certificate Application: Principles of Machine Learning and Artificial Intelligence	2:41	2nd Read/ Action	#6/10/25-25	Kaupp
11. GE Application: Area 1B: Air Conditioning Mechanic Apprenticeship Program	2:46	2nd Read/ Action	#6/10/25-26	Kaupp
12. GE Application: Area 2: Air Conditioning Mechanic Apprenticeship Program		2nd Read/ Action	#6/10/25-27	Kaupp
13. GE Application: Area 4: Air Conditioning Mechanic Apprenticeship Program		2nd Read/ Action	#6/10/25-28	Kaupp
14. GE Application: Area 5: Air Conditioning Mechanic Apprenticeship Program		2nd Read/ Action	#6/10/25-29	Kaupp
15. GE Application: Area 7: Air Conditioning Mechanic Apprenticeship Program		2nd Read/ Action	#6/10/25-30	Kaupp
16. Minimum Grade Requirement for Foothill GE Courses	2:52	Discussion	#6/10/25-31	Gilstrap
17. Exception Process for Starting Courses Prior to Catalog Publication	3:12	Information	#6/10/25-32	Hueg
18. CCC Priorities for 2025-26	3:17	Discussion		Kaupp
19. Good of the Order	3:27			Kaupp
20. Adjournment	3:30			Kaupp

**Times listed are approximate*

Consent Calendar:

#6/10/25-16 Division Curriculum Committees 6.10.25

Attachments:

#6/10/25-1	Draft Minutes: May 27, 2025
#6/10/25-2–14	New Course Proposals: C S 63B, C S 63C, CHLD 18, GEOG 16A, GEOG 16B, GEOG 16C, GEOG 16D, GEOG 416A, GEOG 416B, GEOG 416C, GEOG 416D, R T 473, THTR 420A
#6/10/25-15	CCC Meeting Dates for 2025-26
#6/10/25-17–20	Stand Alone Applications: EMS 60C, EMS 61C, EMS 62C
#6/10/25-21–22	Stand Alone Applications: NCAL 419J, NCAL 419K
#6/10/25-23	New Degree Application: Semiconductor Process Engineering AS
#6/10/25-24	New Certificate Application: Vacuum Technology
#6/10/25-25	New Certificate Application: Principles of Machine Learning and Artificial Intelligence
#6/10/25-26	Foothill General Education Application for Area 1B—Oral Communication & Critical Thinking: Air Conditioning Mechanic Apprenticeship Program
#6/10/25-27	Foothill General Education Application for Area 2—Mathematical Concepts & Quantitative Reasoning: Air Conditioning Mechanic Apprenticeship Program
#6/10/25-28	Foothill General Education Application for Area 4—Social & Behavioral Sciences: Air Conditioning Mechanic Apprenticeship Program
#6/10/25-29	Foothill General Education Application for Area 5—Natural Sciences w/ Lab: Air Conditioning Mechanic Apprenticeship Program
#6/10/25-30	Foothill General Education Application for Area 7—Lifelong Learning: Air Conditioning Mechanic Apprenticeship Program
#6/10/25-31	Minimum Grade Requirement for Foothill GE
#6/10/25-32	Exception Process for Starting Courses Prior to Catalog Publication—updated

2024-2025 Curriculum Committee Meetings:

Fall 2024 Quarter	Winter 2025 Quarter	Spring 2025 Quarter
~~10/8/24~~	~~1/21/25~~	~~4/15/25~~
~~10/22/24~~	~~2/4/25~~	~~4/29/25~~
~~11/5/24~~	~~2/18/25~~	~~5/13/25~~
~~11/19/24~~	~~3/4/25~~	~~5/27/25~~
~~12/3/24~~	~~3/18/25~~	6/10/25

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

2024-2025 Curriculum Deadlines:

~~*12/2/24*~~	Deadline to submit courses for Cal-GETC approval (Articulation Office).
~~*4/18/25*~~	Deadline to submit curriculum sheet updates for 2025-26 catalog (Faculty/Divisions).
~~*6/2/25*~~	Deadline to submit new/revised courses to UCOP for UC transferability (Articulation Office).
6/20/25	Deadline to submit course updates and local GE applications for 2026-27 catalog (Faculty/Divisions).
Ongoing	Submission of courses for C-ID approval and course-to-course articulation with individual colleges and universities (Articulation Office).

Distribution:
Ulysses Acevedo (LA), Chris Allen (Dean, APPR), Jeff Bissell (KA), Sam Bliss (De Anza AVP Instruction), Cynthia Brannvall (FAC), Rachelle Campbell (HSH), Zach Cembellin (Dean, STEM), Anthony Cervantes (Dean, Enrollment Services), Sam Connell (BSS), Robert Cormia (STEM), Stephanie Crosby (Dean, SRC), Cathy Draper (HSH), Angie Dupree (BSS), Kelly Edwards (KA), Gina Firenzi (APPR), Jordan Fong (FAC), Laura Gamez (LRC), Patricia Gibbs Stayte (BSS), Evan Gilstrap (Articulation Officer), Stacy Gleixner (VP Instruction), Katie Ha (LRC), Ron Herman (Dean, FAC), Kurt Hueg (Administrator Co-Chair), Rose Huynh (LA), Maritza Jackson Sandoval (CNSL), Ben Kaupp (Faculty Co-Chair), Natalie Latteri (BSS), Andy Lee (CNSL), Brian Murphy (APPR), Tim Myres (APPR), Teresa Ong (AVP Workforce), Sarah Parikh (STEM), Bob Sandor (STEM), Richard Saroyan (SRC), Amy Sarver (LA), Sukhjit Singh (De Anza CCC Faculty Co-Chair), Paul Starer (APPR), Shae St. Onge-Cole (HSH), Kyle Taylor (STEM), Mary Vanatta (Curriculum Coordinator), Nate Vennarucci (APPR), Voltaire Villanueva (AS President), Fiona Wiesner (Foothill Script), Erik Woodbury (De Anza AS President)

Updated 4/23/25

COLLEGE CURRICULUM COMMITTEE

Committee Members – 2024-25

Meeting Date: 6/10/25

Co-Chairs (2)

✔*	Ben Kaupp	408-874-6380	Vice President, Academic Senate (tiebreaker vote only) kauppben@fhda.edu
✔*	Kurt Hueg	7179	Associate Vice President of Instruction huegkurt@fhda.edu

Voting Membership (1 vote per division)

	Ulysses Acevedo	7507	LA	acevedoulysses@fhda.edu
✔	Jeff Bissell	7663	KA	bisselljeff@fhda.edu
✔*	Cynthia Brannvall	7477	FAC	brannvallcynthia@fhda.edu
✔*	Rachelle Campbell	7469	HSH	campbellrachelle@fhda.edu
✔*	Zach Cembellin	7383	Dean—STEM	cembellinzachary@fhda.edu
✔*	Sam Connell	7197	BSS	connellsamuel@fhda.edu
✔*	Cathy Draper	7249	HSH	drapercatherine@fhda.edu
✔*	Angie Dupree		BSS	dupreeangelica@fhda.edu
	Kelly Edwards	7327	KA	edwardskelly@fhda.edu
✔*	Jordan Fong	7272	FAC	fongjordan@fhda.edu
✔*	Laura Gamez	7602	LRC	gamezlaura@fhda.edu
✔*	Evan Gilstrap	7675	Articulation	gilstrapevan@fhda.edu
✔	Katie Ha	7447	LRC	hakatie@fhda.edu
✔*	Ron Herman	7156	Dean—FAC	hermanron@fhda.edu
✔*	Maritza Jackson Sandoval	7409	CNSL	jacksonsandovalmaritza@fhda.edu
	Andy Lee	7783	CNSL	leeandrew@fhda.edu
	Brian Murphy		APPR	brian@pttc.edu
	Tim Myres		APPR	timm@smw104jatc.org
	Bob Sandor		STEM	sandorrobert@fhda.edu
✔	Richard Saroyan	7232	SRC	saroyanrichard@fhda.edu
	Amy Sarver	7459	LA	sarveramy@fhda.edu
	Shae St. Onge-Cole	7818	HSH	stonge-coleshaelyn@fhda.edu
✔*	Kyle Taylor	7126	STEM	taylorkyle@fhda.edu

Non-Voting Membership (4)

			ASFC Rep.	
✔*	Mary Vanatta	7439	Curr. Coordinator	vanattamary@fhda.edu
			Evaluations	
			SLO Coordinator	

Visitors

Chris Allen*, Paul Starer, Nate Vennarucci*

** Indicates in-person attendance*

College Curriculum Committee
Meeting Minutes
Tuesday, May 27, 2025
2:00 p.m. – 3:30 p.m.
Administrative Conference Room 1901; virtual option via Zoom

Item	Discussion
1. Minutes: May 13, 2025	Motion to approve **M/S** (Draper, Brannvall). **Approved.**
2. Report Out from CCC Members	**Speaker: All** Apprenticeship: Myres shared working on Title 5 updates. BSS: Dupree shared working on Title 5 updates and new courses. Counseling: No updates to report. SRC: Kaupp serving as in-person proxy. Shared working on COR updates. Fine Arts & Comm.: Fong shared working on Title 5 updates and new courses. HSH: Dupree shared working on Title 5 updates. LRC: No updates to report. STEM: Taylor shared working on Title 5 updates. Gilstrap shared he's been reviewing COR submissions and drafting GE advising sheets for next year; working w/ Communication Studies dept. faculty on additional revisions to COMM C1000H; updating course data in ASSIST; collaborating w/ Counseling colleagues on Program Maps. Hueg shared he's working on block scheduling and annual schedule project.
3. Public Comment on Items Not on Agenda	Dupree mentioned Foothill Innovation Challenge Day this Thursday and asked folks to lend their expertise to evaluate and vote on projects! Vanatta mentioned the FHDA LGBTQ+ flag raising and Grand Opening of Foothill Pride Center event on June 4 from 12-2 PM.
4. Announcements a. New Course Proposals	**Speakers: CCC Team** The following proposals were presented: AHS 452; GID 70R series; GID 401, 431, 433, 434, 435, 436, 437, 443, 453A, 453B, 453C, 455, 456, 460; HUMN 17; JRYM 422A, 422B, 422C, 422D, 422E, 423L, 427, 427A, 428, 430, 430B; LINC 51E, 51F, 477A, 477B, 477C, 477D, 478C, 484, 484A, 484D, 484E, 484F; PSE 49; PSYC 18. Many are mirrored noncredit CTE courses. Vanatta shared update from PSE 49 faculty author: course will likely be 1 hour lecture per week. Lee mentioned GID mirrored noncredit courses, asking how it would work if a student takes the noncredit version but then wants to use the credit version to earn a degree—Hueg responded, Credit for Prior Learning could possibly be used in that type of situation, but more discussion would need to happen.
b. Recent CCCCO Approvals!	Vanatta announced we've received state approval for three new noncredit certificates: Theatre Costume and Makeup, Theatre Production Organization, and Theatre Technology! All three will be active for the 2025-26 catalog.

c. Division Reps for 2025-26	Kaupp asked the reps to report out at next meeting who the reps will be for their division next year, if possible.
d. CCC Priorities for 2025-26	Kaupp asked the group to gather thoughts about what CCC's priorities should be for next year, noting that finalizing the Foothill GE process will be a major topic. Please bring ideas to the next meeting.
5. Consent Calendar a. Division Curriculum Committees	**Speaker: Ben Kaupp** Document includes details about each division CC. Kaupp noted no changes since previous meeting. Dupree mentioned BSS holding additional meeting on June 2. Draper mentioned HSH holding additional meeting on June 6. Motion to approve **M/S** (Fong, Draper). **Approved.**
6. Stand Alone Applications: NCBS 404A, 404B	**Speaker: Ben Kaupp** Second read of Stand Alone Approval Requests for NCBS 404A & 404B. Motion to approve **M/S** (Draper, Taylor). **Approved.**
7. New Certificate Proposal: Emergency Medical Technician	**Speaker: Ben Kaupp** Proposal for new Emergency Medical Technician Certificate of Achievement. Campbell noted that a noncredit certificate exists, and this will be the credit version; courses have been offered for many years but without a related certificate. *See item 8 for motion/approval details.*
8. New Certificate Proposal: 12-Lead ECG Interpretation (noncredit)	**Speaker: Ben Kaupp** Proposal for new 12-Lead ECG Interpretation noncredit certificate. Motion to approve items 7-8 **M/S** (Myres, Taylor). **Approved.**
9. Stand Alone Applications: EMS 60C, 61C, 62C	**Speaker: Ben Kaupp** First read of Stand Alone Approval Requests for EMS 60C, 61C & 62C, all three of which will be permanently Stand Alone. Second read and possible action will occur at next meeting.
10. Stand Alone Applications: NCAL 419J, 419K	**Speaker: Ben Kaupp** First read of Stand Alone Approval Requests for NCAL 419J & 419K, both of which will be permanently Stand Alone. Kaupp noted these will be the first offerings of noncredit courses for older adults. Motion to suspend two reads rule **M/S** (Brannvall, Campbell). **Approved.** Motion to approve **M/S** (Brannvall, Fong). **Approved.**
11. New Degree Application: Semiconductor Process Engineering AS	**Speaker: Ben Kaupp** First read of new Semiconductor Process Engineering AS degree. Kaupp noted there is no ADT version of this degree—Gilstrap confirmed. Second read and possible action will occur at next meeting.
12. New Certificate Application: Vacuum Technology	**Speaker: Ben Kaupp** First read of new Vacuum Technology Certificate of Achievement. Hueg asked if this is aligned with an Apprenticeship program—Allen responded, yes, and noted it is a stackable certificate. Second read and possible action will occur at next meeting.

13. New Certificate Application: Principles of Machine Learning and Artificial Intelligence	**Speaker: Ben Kaupp** First read of new Principles of Machine Learning and Artificial Intelligence Certificate of Achievement. Hueg mentioned LINC course related to AI and brief discussion occurred re: possible collaboration. Second read and possible action will occur at next meeting.
14. GE Application: Area 1B: Air Conditioning Mechanic Apprenticeship Program	**Speaker: Ben Kaupp** First read of GE application for Area 1B, Oral Communication & Critical Thinking. Kaupp noted items 14-18, if approved, would allow for students completing the full degree program to fulfill local GE areas. Second read and possible action will occur at next meeting.
15. GE Application: Area 2: Air Conditioning Mechanic Apprenticeship Program	**Speaker: Ben Kaupp** First read of GE application for Area 2, Mathematical Concepts & Quantitative Reasoning. Second read and possible action will occur at next meeting.
16. GE Application: Area 4: Air Conditioning Mechanic Apprenticeship Program	**Speaker: Ben Kaupp** First read of GE application for Area 4, Social & Behavioral Sciences. Second read and possible action will occur at next meeting.
17. GE Application: Area 5: Air Conditioning Mechanic Apprenticeship Program	**Speaker: Ben Kaupp** First read of GE application for Area 5, Natural Sciences w/ Lab. Second read and possible action will occur at next meeting.
18. GE Application: Area 7: Air Conditioning Mechanic Apprenticeship Program	**Speaker: Ben Kaupp** First read of GE application for Area 7, Lifelong Learning. Second read and possible action will occur at next meeting.
19. Certificate Name Change: Emergency Medical Technician (noncredit)	**Speaker: Ben Kaupp** The HSH division has approved a name change for the current Emergency Medical Technology noncredit certificate, to Emergency Medical Technician. This change is planned to go into effect for the 2025-26 catalog.
20. Minimum Grade Requirement for Foothill GE Courses	**Speaker: Evan Gilstrap** Continuing discussion from previous meetings, regarding need to decide if we want to establish a minimum grade requirement for Foothill GE and, if so, what this requirement would be. Attachment presents five options: four originally discussed at April 29 meeting, plus option added during previous meeting (#3 on attachment). *[Please note: all references to option numbers refer to this most recent version of the attachment. Some feedback was given based on the numbers used in the original attachment, and those option numbers have been updated to be consistent with the most recent attachment.]* Kaupp shared extensive feedback from English dept., which boiled down to preferring option #4. Kaupp recalled discussion from previous meeting re: whether D grade is valid or not, and wants to ensure the group is not conflating how we give D grades with how we consider such grades for degrees. The traditional purpose for a D was to indicate the student met the technical requirements for a class but was below average; this has migrated, and D grade now used to pass students for other types of reasons. Wants the group to be careful we don't make our decision as an effort to make up for bad policies elsewhere; if we have bad policies around D grade, those should be fixed. Expressed his own conflicting views on topic, and will defer to the group's decision.

Dupree shared feedback from BSS faculty: between options #4 & #5, with most preferring option #4. Some felt uncomfortable "ranking" certain disciplines above others, and some mentioned wanting to protect students who might change their minds and switch from Foothill GE to transfer GE pattern which doesn't allow for D grades.

Kaupp reminded the group that regardless of our decision, students must have an overall GPA of 2.0 or higher. Starer asked the group to consider what message we're sending if we require students to take the full GE pattern but we don't care enough that they pass all of the courses. Campbell shared feedback from her students, who are concerned that [if we require C or better for entire pattern] students might be given C grades to avoid them getting D grades, and are also concerned that many would be upset by such a big change in requirements. Taylor shared feedback from STEM faculty: most in favor of option #4, and some of #3.

Gilstrap asked the group how many knew students are currently able to use D grades for most of Foothill GE areas—a few folks raised their hands. Gilstrap reiterated we're not considering lowering standards, when it comes to GPA for local associate degrees. Doesn't believe it's very common for students to use multiple D grades to complete Foothill GE. Discussion occurred re: situations in which a student might get a D grade in a course they eventually (or plan to) use for GE.

Brannvall shared personal experience about being a community college graduate and expressed opinion that the associate degree should mean something and students should be proud to earn one. Concerned that lowering standards sends the opposite message. Allen expressed agreement. Starer believes this topic raises the question of the meaning of grades and the topic of grade inflation. Kaupp suggested that no matter what we decide, faculty might simply adjust their own grading policies to adjust.

Lee believes everyone's opinions on the topic are valid and correct. Mentioned he reviewed local degree petitions from recent quarters and doesn't recall seeing any D grades used; believes most students re-take a class when they receive a D. Shared feedback from Counseling faculty: in favor of option #2. Starer noted hard work done by faculty to submit courses for Foothill GE and wondered how they would feel about students being able to use a D to satisfy requirement.

Kaupp asked CCC members for their informal vote:

- STEM: option #4 (or #3)
- SRC: no opinion
- LRC: Ha hasn't heard any feedback from LRC constituents; would go with option #4
- LA: reps not in attendance; Gilstrap believes option #3 based on feedback received
- KA: likely option #4
- HSH: 50/50 between options #3 & #4
- Fine Arts & Comm.: Brannvall noted topic has had to be delayed at two division CC meetings, so must abstain until it can be discussed
- Counseling: option #2 (or #3)
- BSS: option #4; Dupree noted some faculty who voted for #4 did say they're between #4 & #5, and some voted for #5

	• Apprenticeship: Myres shared info on how D grades are handled for Apprenticeship students; no opinion on any of the options • Gilstrap: option #2 (or #3) • Herman: option #4 (or #3) • Hueg: option #4; doesn't believe having a D on a transcript is a positive thing for anyone • Cembellin: option #4 (or #3) Campbell echoed Starer's thoughts about what a grade means and expressed her own concerns about the grades students are being given. Gilstrap mentioned that students have many other things going on in their lives, which can affect their performance in a course, and reiterated that the topic up for discussion is about local GE only. Noted that community college is generally related to upward mobility, and students work hard both in and outside of class. Brannvall agreed and mentioned the need for students to have scaffolding and support for second chances; however, doesn't think diminishing our degree requirements is necessarily the way to respond. Kaupp shared example of a student who received a D; wouldn't want this to impact the student's future opportunities, but at the same time knows that some students are given D grades who very much did not learn any of the course content. Starer suggested using option #4, and creating a petition for students to request using one course with a D grade. Gilstrap likes the idea but asked what the requirements/conditions would be for the petition—Kaupp responded, CCC would need to determine that. Kaupp recalled Lee's comment that very, very few students use D grades to complete a local degree, and noted that no matter which option we choose it will likely have minimal effect on graduation numbers. It might instead have an effect on faculty's grading philosophy and students' anxiety levels over earning a certain grade on a GE course. Kaupp thanked the group for a robust discussion and doesn't believe we're ready to take an official vote. There will be a vote on this topic at the next meeting, so come prepared.
21. Good of the Order	
22. Adjournment	**3:19 PM**

Attendees: Chris Allen* (Dean, APPR), Jeff Bissell (KA), Cynthia Brannvall* (FAC), Rachelle Campbell* (HSH), Zach Cembellin* (Dean, STEM), Anthony Cervantes (Dean, Enrollment Services), Sam Connell (BSS), Cathy Draper* (HSH), Angie Dupree* (BSS), Jordan Fong* (FAC), Evan Gilstrap* (Articulation Officer), Katie Ha* (LRC), Ron Herman* (Dean, FAC), Kurt Hueg* (Administrator Co-Chair), Maritza Jackson Sandoval (CNSL), Ben Kaupp* (Faculty Co-Chair), Andy Lee* (CNSL), Tim Myres* (APPR), Richard Saroyan (SRC), Paul Starer (APPR), Kyle Taylor* (STEM), Mary Vanatta* (Curriculum Coordinator), Nate Vennarucci* (APPR)
** Indicates in-person attendance*

Minutes Recorded by: M. Vanatta

Course Change Request

New Course Proposal

Date Submitted: 05/29/25 1:49 pm

Viewing: **C S F063B : APP DEVELOPMENT WITH SWIFT CERTIFICATION**

Last edit: 06/04/25 9:38 am

Changes proposed by: Mike Murphy (10542685)

In Workflow

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

Approval Path

1. 06/03/25 2:44 pm Kyle Taylor (taylorkyle): Approved for 1PS Curriculum Rep

Course Proposal Form

Faculty Author	Mike Murphy		
Effective Term	Fall 2026		
Subject	Computer Science (C S)	Course Number	F063B
Department	Computer Science (C S)		
Division	Science Technology Engineering and Mathematics (1PS)		
Units	4.5		
Hours	4 lecture, 2 lab (weekly)		
Course Title	APP DEVELOPMENT WITH SWIFT CERTIFICATION		
Short Title			

Proposed Transferability	CSU Only
Proposed Description and Requisites:	Demonstrate knowledge of the impact of computing and apps on society, economies, and cultures while exploring Swift app development.
Proposed Discipline	Computer Science

To which Degree(s) or Certificate(s) would this course potentially be added?

C S AS Degree

Swift Programming Certificate of Achievement

Are there any other departments that may be impacted from the addition of this course?

No

Comments & Other Relevant Information for Discussion:

This is an extension to our current App Development Curriculum.

Reviewer Comments

Key: 9308

Course Change Request

New Course Proposal

Date Submitted: 05/29/25 2:16 pm

Viewing: C S F063C : DEVELOP IN SWIFT - DATA COLLECTIONS

Last edit: 06/04/25 9:40 am

Changes proposed by: Mike Murphy (10542685)

In Workflow

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

Approval Path

1. 06/03/25 2:45 pm Kyle Taylor (taylorkyle): Approved for 1PS Curriculum Rep

Course Proposal Form

Faculty Author	Mike Murphy		
Effective Term	Fall 2026		
Subject	Computer Science (C S)	Course Number	F063C
Department	Computer Science (C S)		
Division	Science Technology Engineering and Mathematics (1PS)		
Units	4.5		
Hours	4 lecture, 2 lab (weekly)		
Course Title	DEVELOP IN SWIFT - DATA COLLECTIONS		
Short Title			

Proposed Transferability	CSU Only
Proposed Description and Requisites:	Students extend their work in iOS app development, creating more complex and capable apps. They'll work with data from a server and explore new iOS APIs that allow for much richer app experiences, including displaying large collections of data in multiple formats. Students learn new features of the iOS SDK to continue their app developer journey.
Proposed Discipline	Computer Science

To which Degree(s) or Certificate(s) would this course potentially be added?

C S AS Degree

Swift Programming Certificate of Achievement

Are there any other departments that may be impacted from the addition of this course?

No

Comments & Other Relevant Information for Discussion:

This is an extension to our current App Development Curriculum.

Reviewer Comments

Key: 9309

Course Change Request

New Course Proposal

Date Submitted: 05/23/25 3:16 pm

Viewing: **CHLD F018. : PSYCHOLOGICAL DISORDERS OF CHILDHOOD & ADOLESCENCE**

Last edit: 05/28/25 8:27 am

Changes proposed by: Nicole Kerbey (11022578)

In Workflow

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

Approval Path

1. 05/27/25 2:02 pm Angelica Dupree (dupreeangelica): Approved for 1SS Curriculum Rep

Course Proposal Form

Faculty Author	Nicole Kerbey		
Effective Term	Fall 2026		
Subject	Child Development (CHLD)	Course Number	F018.
Department	Child Development (CHLD)		
Division	Business and Social Sciences (1SS)		
Units	4		
Hours	4 hours lecture per week		
Course Title	PSYCHOLOGICAL DISORDERS OF CHILDHOOD & ADOLESCENCE		
Short Title			

Proposed Transferability	UC/CSU
Proposed Description and Requisites:	This course provides an overview of various psychological disorders in children and adolescents, with a focus on assessment, diagnosis, and treatment. The course will cover anxiety and mood disorders, attachment disorders, trauma-related disorders, impulse control and conduct disorders, feeding and eating disorders, attention-deficit/ hyperactivity disorder, autism spectrum disorder, and other learning disorders. Through a multicultural view, students will analyze empirical evidence and theoretical perspectives on childhood and adolescence psychopathology.
Proposed Discipline	Child Development/Early Childhood Education or Psychology

To which Degree(s) or Certificate(s) would this course potentially be added?

AA Degree in Psychology
AA-T Degree in Psychology
AA Degree in Child Development
AA-T Degree in Child Development
Certificate of Achievement (Child Development and Psychology)
Foothill GE

Are there any other departments that may be impacted from the addition of this course?

Yes

What Department(s)?

Other Department	Effect on Department
Psychology	This course will be cross-listed with the Psychology Department. Course number PSYC F018.

Comments & Other Relevant Information for Discussion:

This course addresses a growing need for interdisciplinary training in child and adolescent mental health, supporting students in both Psychology and Child Development programs. By offering it as a cross-listed course, we will better prepare students pursuing careers in psychology, education, and counseling, and enhance culturally responsive approaches to supporting youth.

Reviewer
Comments

Key: 9307

Course Change Request

New Course Proposal

Date Submitted: 05/27/25 1:31 pm

Viewing: GEOG F016A : GEOGRAPHY FIELD STUDIES: PHYSICAL SYSTEMS

Last edit: 05/29/25 11:09 am

Changes proposed by: Alexis Aguilar (20307989)

In Workflow

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

Approval Path

1. 05/22/25 6:58 am Angelica Dupree (dupreeangelica): Approved for 1SS Curriculum Rep
2. 05/27/25 7:32 am Mary Vanatta (vanattamary): Rollback to Initiator
3. 05/27/25 2:02 pm Angelica Dupree (dupreeangelica): Approved for 1SS Curriculum Rep

Course Proposal Form

Faculty Author	Alexis Aguilar		
Effective Term	Fall 2026		
Subject	Geography (GEOG)	Course Number	F016A
Department	Geography (GEOG)		
Division	Business and Social Sciences (1SS)		
Units	1.5		
Hours	12 lecture, 18 lab (total)		
Course Title	GEOGRAPHY FIELD STUDIES: PHYSICAL SYSTEMS		
Short Title			

Proposed Transferability

UC/CSU

Proposed Description and Requisites:

Explore the physical processes shaping regional environments, including climate patterns, geomorphology, and coastal dynamics. The course emphasizes how landforms, weather systems, and coastlines interact, while also examining how humans impact and adapt to these changing physical landscapes.

Field studies and practice using the tools and perspective of geography to observe, measure, and evaluate the landscape. Includes the ability to describe and interpret spatial patterns, the ability to collect and analyze spatial and non-spatial data, and the ability to draw valid conclusions as to the processes responsible for those patterns. This course will have elements of both human and physical geography and a focus on human-environment relations.

Advisory: Physical Geography (GEOG 01) and Human Geography (GEOG 02).

Proposed Discipline

Geography

To which Degree(s) or Certificate(s) would this course potentially be added?

Geography AA-T
Geography AS
GIST AS

Are there any other departments that may be impacted from the addition of this course?

No

Comments & Other Relevant Information for Discussion:

Course may have lab fees. A non-credit version of this course will also be offered.

Reviewer Comments

Mary Vanatta (vanattamary) (05/27/25 7:32 am): Rollback: Rolling back at the request of the division.

Course Change Request

New Course Proposal

Date Submitted: 05/24/25 6:34 pm

Viewing: **GEOG F016B : GEOGRAPHY FIELD STUDIES: ECOLOGICAL SYSTEMS**

Last edit: 05/29/25 11:11 am

Changes proposed by: Alexis Aguilar (20307989)

In Workflow

1. **1SS Curriculum Rep**
2. **Curriculum Coordinator**
3. Activation

Approval Path

1. 05/24/25 8:14 am Angelica Dupree (dupreeangelica): Rollback to Initiator
2. 05/27/25 2:02 pm Angelica Dupree (dupreeangelica): Approved for 1SS Curriculum Rep

Course Proposal Form

Faculty Author	Alexis Aguilar		
Effective Term	Fall 2026		
Subject	Geography (GEOG)	Course Number	F016B
Department	Geography (GEOG)		
Division	Business and Social Sciences (1SS)		
Units	1.5		
Hours	12 lecture, 18 lab (total)		
Course Title	GEOGRAPHY FIELD STUDIES: ECOLOGICAL SYSTEMS		
Short Title			

Proposed Transferability	UC/CSU
Proposed Description and Requisites:	Study the spatial distribution of ecosystems and species through biogeography and ecological principles. Students analyze how climate, terrain, and human activity shape ecosystems, and how communities adapt to environmental changes and ecological stressors. Field studies and practice using the tools and perspective of geography to observe, measure, and evaluate the landscape. Includes the ability to describe and interpret spatial patterns, the ability to collect and analyze spatial and non-spatial data, and the ability to draw valid conclusions as to the processes responsible for those patterns. This course will have elements of both human and physical geography and a focus on human-environment relations. Advisory: Physical Geography (GEOG 01) and Human Geography (GEOG 02).
Proposed Discipline	Geography

To which Degree(s) or Certificate(s) would this course potentially be added?

Geography AA-T
Geography AS
GIST AS

Are there any other departments that may be impacted from the addition of this course?

No

Comments & Other Relevant Information for Discussion:

Course may have lab fees. A non-credit version of this course will also be offered.

Reviewer Comments: **Angelica Dupree (dupreeangelica) (05/24/25 8:14 am):** Rollback: Hi Alexis, rolling this back so you can update the course name.

Course Change Request

New Course Proposal

Date Submitted: 05/24/25 6:35 pm

Viewing: GEOG F016C : GEOGRAPHY FIELD STUDIES: FOOD SYSTEMS

Last edit: 05/29/25 11:12 am

Changes proposed by: Alexis Aguilar (20307989)

In Workflow

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

Approval Path

1. 05/24/25 8:15 am Angelica Dupree (dupreeangelica): Rollback to Initiator
2. 05/27/25 2:02 pm Angelica Dupree (dupreeangelica): Approved for 1SS Curriculum Rep

Course Proposal Form

Faculty Author	Alexis Aguilar		
Effective Term	Fall 2026		
Subject	Geography (GEOG)	Course Number	F016C
Department	Geography (GEOG)		
Division	Business and Social Sciences (1SS)		
Units	1.5		
Hours	12 lecture, 18 lab (total)		
Course Title	GEOGRAPHY FIELD STUDIES: FOOD SYSTEMS		
Short Title			

Proposed Transferability
UC/CSU

Proposed Description and Requisites:
Investigate how regional soil types, vegetation patterns, and climate conditions intersect with cultural practices to shape food systems. Topics include agricultural land use, sustainability, and how food production both influences and responds to environmental and societal change.

Field studies and practice using the tools and perspective of geography to observe, measure, and evaluate the landscape. Includes the ability to describe and interpret spatial patterns, the ability to collect and analyze spatial and non-spatial data, and the ability to draw valid conclusions as to the processes responsible for those patterns. This course will have elements of both human and physical geography and a focus on human-environment relations.

Advisory: Physical Geography (GEOG 01) and Human Geography (GEOG 02).

Proposed Discipline
Geography

To which Degree(s) or Certificate(s) would this course potentially be added?
Geography AA-T
Geography AS
GIST AS

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

Comments & Other Relevant Information for Discussion:
Course may have lab fees. A non-credit version of this course will also be offered.

Reviewer Comments
Angelica Dupree (dupreeangelica) (05/24/25 8:15 am): Rollback: Hi Alexis, rolling this back so you can update the course name.

Course Change Request

New Course Proposal

Date Submitted: 05/24/25 6:36 pm

Viewing: **GEOG F016D : GEOGRAPHY FIELD STUDIES: HUMAN & URBAN SYSTEMS**

Last edit: 05/29/25 11:13 am

Changes proposed by: Alexis Aguilar (20307989)

In Workflow

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

Approval Path

1. 05/24/25 8:15 am Angelica Dupree (dupreeangelica): Rollback to Initiator
2. 05/27/25 2:02 pm Angelica Dupree (dupreeangelica): Approved for 1SS Curriculum Rep

Course Proposal Form

Faculty Author	Alexis Aguilar		
Effective Term	Fall 2026		
Subject	Geography (GEOG)	Course Number	F016D
Department	Geography (GEOG)		
Division	Business and Social Sciences (1SS)		
Units	1.5		
Hours	12 lecture, 18 lab (total)		
Course Title	GEOGRAPHY FIELD STUDIES: HUMAN & URBAN SYSTEMS		
Short Title			

Proposed Transferability: UC/CSU

Proposed Description and Requisites: Examine how human societies adapt to their environments, shape patterns of settlement, and drive regional development. The course explores the dynamic relationship between culture, place, and environment, highlighting how human-environment interactions shape landscapes, and how societies can adapt, organize, and pursue sustainable development.

Field studies and practice using the tools and perspective of geography to observe, measure, and evaluate the landscape. Includes the ability to describe and interpret spatial patterns, the ability to collect and analyze spatial and non-spatial data, and the ability to draw valid conclusions as to the processes responsible for those patterns. This course will have elements of both human and physical geography and a focus on human-environment relations.

Advisory: Physical Geography (GEOG 01) and Human Geography (GEOG 02).

Proposed Discipline: Geography

To which Degree(s) or Certificate(s) would this course potentially be added?

Geography AA-T
Geography AS
GIST AS

Are there any other departments that may be impacted from the addition of this course?

No

Comments & Other Relevant Information for Discussion:

Course may have lab fees. A non-credit version of this course will also be offered.

Reviewer: **Angelica Dupree (dupreeangelica) (05/24/25 8:15 am):** Rollback: Hi Alexis, rolling

Course Change Request

New Course Proposal

Date Submitted: 05/23/25 9:27 pm

Viewing: **GEOG F416A : GEOGRAPHY FIELD STUDIES: PHYSICAL SYSTEMS NONCREDIT**

Last edit: 06/02/25 12:36 pm

Changes proposed by: Alexis Aguilar (20307989)

In Workflow

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

Approval Path

1. 05/24/25 8:12 am Angelica Dupree (dupreeangelica): Approved for 1SS Curriculum Rep

Course Proposal Form

Faculty Author	Alexis Aguilar		
Effective Term	Fall 2026		
Subject	Geography (GEOG)	Course Number	F416A
Department	Geography (GEOG)		
Division	Business and Social Sciences (1SS)		
Units	0		
Hours	12 lecture, 18 lab (total)		
Course Title	GEOGRAPHY FIELD STUDIES: PHYSICAL SYSTEMS NONCREDIT		
Short Title			

Proposed Transferability	None
Proposed Description and Requisites:	Explore the physical processes shaping regional environments, including climate patterns, geomorphology, and coastal dynamics. The course emphasizes how landforms, weather systems, and coastlines interact, while also examining how humans impact and adapt to these changing physical landscapes. Field studies and practice using the tools and perspective of geography to observe, measure, and evaluate the landscape. Includes the ability to describe and interpret spatial patterns, the ability to collect and analyze spatial and non-spatial data, and the ability to draw valid conclusions as to the processes responsible for those patterns. This course will have elements of both human and physical geography and a focus on human-environment relations. Advisory: Physical Geography (GEOG 01) and Human Geography (GEOG 02).
Proposed Discipline	Geography

To which Degree(s) or Certificate(s) would this course potentially be added?

Will possibly be included in a new certificate in sustainability.

Are there any other departments that may be impacted from the addition of this course?

No

Comments & Other Relevant Information for Discussion:

Course may have lab fees. This is a non-credit mirror of GEOG 16A.

Reviewer Comments

Key: 9276

Course Change Request

New Course Proposal

Date Submitted: 05/23/25 9:27 pm

Viewing: **GEOG F416B : GEOGRAPHY FIELD STUDIES: ECOLOGICAL SYSTEMS NONCREDIT**

Last edit: 06/02/25 12:40 pm

Changes proposed by: Alexis Aguilar (20307989)

In Workflow

1. **1SS Curriculum Rep**
2. **Curriculum Coordinator**
3. Activation

Approval Path

1. 05/24/25 8:13 am Angelica Dupree (dupreeangelica): Approved for 1SS Curriculum Rep

Course Proposal Form

Faculty Author	Alexis Aguilar		
Effective Term	Fall 2026		
Subject	Geography (GEOG)	Course Number	F416B
Department	Geography (GEOG)		
Division	Business and Social Sciences (1SS)		
Units	0		
Hours	12 lecture, 18 lab (total)		
Course Title	GEOGRAPHY FIELD STUDIES: ECOLOGICAL SYSTEMS NONCREDIT		
Short Title			

Proposed Transferability
None

Proposed Description and Requisites:
Study the spatial distribution of ecosystems and species through biogeography and ecological principles. Students analyze how climate, terrain, and human activity shape ecosystems, and how communities adapt to environmental changes and ecological stressors.

Field studies and practice using the tools and perspective of geography to observe, measure, and evaluate the landscape. Includes the ability to describe and interpret spatial patterns, the ability to collect and analyze spatial and non-spatial data, and the ability to draw valid conclusions as to the processes responsible for those patterns. This course will have elements of both human and physical geography and a focus on human-environment relations.

Advisory: Physical Geography (GEOG 01) and Human Geography (GEOG 02).

Proposed Discipline
Geography

To which Degree(s) or Certificate(s) would this course potentially be added?
Will possibly be included in a new certificate in sustainability.

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

Comments & Other Relevant Information for Discussion:
Course may have lab fees. This is a non-credit mirror of GEOG 16B.

Reviewer Comments

Key: 9277

Course Change Request

New Course Proposal

Date Submitted: 05/23/25 9:27 pm

Viewing: **GEOG F416C : GEOGRAPHY FIELD STUDIES: FOOD SYSTEMS NONCREDIT**

Last edit: 06/02/25 12:43 pm

Changes proposed by: Alexis Aguilar (20307989)

In Workflow

1. **1SS Curriculum Rep**
2. **Curriculum Coordinator**
3. Activation

Approval Path

1. 05/24/25 8:13 am Angelica Dupree (dupreeangelica): Approved for 1SS Curriculum Rep

Course Proposal Form

Faculty Author	Alexis Aguilar		
Effective Term	Fall 2026		
Subject	Geography (GEOG)	Course Number	F416C
Department	Geography (GEOG)		
Division	Business and Social Sciences (1SS)		
Units	0		
Hours	12 lecture, 18 lab (total)		
Course Title	GEOGRAPHY FIELD STUDIES: FOOD SYSTEMS NONCREDIT		
Short Title			

Proposed Transferability
None

Proposed Description and Requisites:
Investigate how regional soil types, vegetation patterns, and climate conditions intersect with cultural practices to shape food systems. Topics include agricultural land use, sustainability, and how food production both influences and responds to environmental and societal change.

Field studies and practice using the tools and perspective of geography to observe, measure, and evaluate the landscape. Includes the ability to describe and interpret spatial patterns, the ability to collect and analyze spatial and non-spatial data, and the ability to draw valid conclusions as to the processes responsible for those patterns. This course will have elements of both human and physical geography and a focus on human-environment relations.

Advisory: Physical Geography (GEOG 01) and Human Geography (GEOG 02).

Proposed Discipline
Geography

To which Degree(s) or Certificate(s) would this course potentially be added?
Will possibly be included in a new certificate in sustainability.

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

Comments & Other Relevant Information for Discussion:
Course may have lab fees. This is a non-credit mirror of GEOG 16C.

Reviewer Comments

Key: 9278

Course Change Request

New Course Proposal

Date Submitted: 05/23/25 9:27 pm

Viewing: **GEOG F416D : GEOGRAPHY FIELD STUDIES: HUMAN & URBAN SYSTEMS NONCREDIT**

Last edit: 06/02/25 12:45 pm

Changes proposed by: Alexis Aguilar (20307989)

In Workflow

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

Approval Path

1. 05/24/25 8:13 am Angelica Dupree (dupreeangelica): Approved for 1SS Curriculum Rep

Course Proposal Form

Faculty Author	Alexis Aguilar		
Effective Term	Fall 2026		
Subject	Geography (GEOG)	Course Number	F416D
Department	Geography (GEOG)		
Division	Business and Social Sciences (1SS)		
Units	0		
Hours	12 lecture, 18 lab (total)		
Course Title	GEOGRAPHY FIELD STUDIES: HUMAN & URBAN SYSTEMS NONCREDIT		
Short Title			

Proposed Transferability	None
Proposed Description and Requisites:	Examine how human societies adapt to their environments, shape patterns of settlement, and drive regional development. The course explores the dynamic relationship between culture, place, and environment, highlighting how human-environment interactions shape landscapes, and how societies can adapt, organize, and pursue sustainable development. Field studies and practice using the tools and perspective of geography to observe, measure, and evaluate the landscape. Includes the ability to describe and interpret spatial patterns, the ability to collect and analyze spatial and non-spatial data, and the ability to draw valid conclusions as to the processes responsible for those patterns. This course will have elements of both human and physical geography and a focus on human-environment relations. Advisory: Physical Geography (GEOG 01) and Human Geography (GEOG 02).
Proposed Discipline	Geography

To which Degree(s) or Certificate(s) would this course potentially be added?

Will possibly be included in a new certificate in sustainability.

Are there any other departments that may be impacted from the addition of this course?

No

Comments & Other Relevant Information for Discussion:

Course may have lab fees. This is a non-credit mirror of GEOG 16D.

Reviewer Comments

Course Change Request

New Course Proposal

Date Submitted: 05/31/25 7:25 pm

Viewing: **R T F473. : ADVANCED CLINICAL EXPERIENCE: MAMMOGRAPHY**

Last edit: 06/06/25 1:06 pm

Changes proposed by: Rachelle Campbell (20029451)

In Workflow

1. **1BH Curriculum Rep**
2. **Curriculum Coordinator**
3. Activation

Approval Path

1. 02/20/25 11:21 pm Rachelle Campbell (campbellrachelle): Rollback to Initiator
2. 06/06/25 12:59 pm Catherine Draper (drapercatherine): Approved for 1BH Curriculum Rep

Course Proposal Form

Faculty Author	Rachelle Campbell		
Effective Term	Fall 2026		
Subject	Radiologic Technology (R T)	Course Number	F473.
Department	Radiologic Technology (R T)		
Division	Health Sciences and Horticulture (1BH)		
Units	0		
Hours	192 clinical lab (total)		
Course Title	ADVANCED CLINICAL EXPERIENCE: MAMMOGRAPHY		
Short Title			

Proposed Transferability
None

Proposed Description and Requisites:
Designed as a practicum in a radiographic mammography department. Practical experience is implemented to expose the student to the principles of mammography with emphasis on mastery of the knowledge, insight, and skills required to perform mammographic procedures.

Prerequisites: Current ARRT (R) and CRT certification as a Radiologic Technologist or current student in the Foothill College Radiologic Technology program; R T 65 or equivalent.

Proposed Discipline
Radiological Technology

To which Degree(s) or Certificate(s) would this course potentially be added?
This is a stand alone course mirrored to the R T 73 credit version. It is CTE course and will always be stand alone.

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

Comments & Other Relevant Information for Discussion:
The purpose of this course is to allow for clinical hands on experience for Radiologic Technology students and Radiologic Technologists intent on pursuing certification in mammography but who have not yet sat for the California State Mammography examination. Due to a massive shortage of licensed Mammographers in California, this course could provide the opportunity to help move more graduates and technologists onto this pathway.

Reviewer Comments
Rachelle Campbell (campbellrachelle) (02/20/25 11:21 pm): Rollback: T

Key: 9236

Course Change Request

New Course Proposal

Date Submitted: 06/02/25 1:58 pm

Viewing: THTR F420A : ACTING I FOR OLDER ADULTS

Last edit: 06/04/25 8:33 am

Changes proposed by: Tom Gough (10517673)

In Workflow

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

Approval Path

1. 06/03/25 2:24 pm Jordan Fong (fongjordan): Approved for 1FA Curriculum Rep

Course Proposal Form

Faculty Author	TOM GOUGH		
Effective Term	Fall 2026		
Subject	Theatre Arts (THTR)	Course Number	F420A
Department	Theatre Arts (THTR)		
Division	Fine Arts and Communication (1FA)		
Units	0		
Hours	4 lecture, 1 lab (weekly)		
Course Title	ACTING I FOR OLDER ADULTS		
Short Title			

Proposed Transferability	None
Proposed Description and Requisites:	Targeted towards older adults, this course features introduction to the craft of acting, including theory and technique emphasizing body movement, voice production, articulation, characterization principles of motivation, scene analysis, cultural empathy through standard theatre games, exercises, monologues, scenes, and the background research thereof.
Proposed Discipline	Theater Arts

To which Degree(s) or Certificate(s) would this course potentially be added?

None - Stand Alone

Are there any other departments that may be impacted from the addition of this course?

No

Comments & Other Relevant Information for Discussion:

Mirrored to parent course THTR 20A.

Reviewer Comments

Key: 9310

Foothill College
College Curriculum Committee
2025-26 Meeting Dates

Fall Quarter:	Winter Quarter:	Spring Quarter:
October 7	January 20	April 14
October 21	February 3	April 28
November 4	February 17	May 12
November 18	March 3	May 26
December 2	March 17	June 9

All meetings fall on Tuesday and will be held from 2:00 p.m. – 3:30 p.m. in Administrative Conference Room 1901 (likely w/ Zoom option).

Note: Meeting dates are tentative and subject to change. The final schedule will be confirmed via calendar invitations sent to CCC members via email.

Foothill College Curriculum Committee Consent Calendar

6/10/25

Division Curriculum Committees

Apprenticeship (APPR) Division Curriculum Committee

- **Chair(s)**: Chris Allen, Brian Murphy, Tim Myres
- **Voting Members**: Tim Myres, Brian Murphy (all apprenticeship ACC members are encouraged to attend)
- **Quorum Requirements**: 2
- **Meeting Schedule**:
    - **Location**: Local 104 Training Center, Fairfield, CA 94534; San Jose Pipes Training Center, San Jose, 95112, Foothill College Sunnyvale Center, Sunnyvale, CA 94089 or via Zoom.
    - **Time and Date**: TBD, 10AM via Zoom
    - **Frequency**: Monthly
- **Agenda Posting**: Posted on the windows facing the entrance doors at the Local 104 Training Center in Fairfield, Pipe Trades Training Center in San Jose and Foothill College Sunnyvale Center.

Business & Social Sciences (BSS) Division Curriculum Committee

- **Chair(s)**: Sam Connell (tenured faculty), Angie Dupree (projected tenure Spring 2026)
- **Voting Members**: Sam Connel, Angie Dupree (all BSS faculty are encouraged to tender advisory votes)
- **Quorum Requirements**: 2 voting members
- **Meeting Schedule**:
    - **Location**: Room 3202
    - **Time and Date**: Mondays at 3:30 pm (and Tuesdays at 3:30 pm when Monday is a holiday)
    - **Frequency**: Monthly in Fall/Winter quarters. Spring dates: 4/14, 5/19, 6/2, 6/16
- **Agenda Posting**: Posted on the window of the division office (building 3000)

Counseling (CNSL) Division Curriculum Committee

- **Chair(s)**: Maritza Jackson Sandoval, Andrew Lee
- **Voting Members**: Maritza Jackson Sandoval, Andrew Lee, Jue Thao
- **Quorum Requirements**: 2 voting members
- **Meeting Schedule**:
    - **Location**: Room 8311
    - **Time and Date**: Tuesdays at 2pm
    - **Frequency**: Monthly (3rd or 4th Tuesday when CCC is not meeting)
- **Agenda Posting**: Posted on the public bulletin board outside the 8300 Building

Disability Resource Center & Veterans Resource Center (SRC) Division Curriculum Committee

- **Chair(s)**: Richard Saroyan
- **Voting Members**: Richard Saroyan, Ben Kaupp
- **Quorum Requirements**: 2
- **Meeting Schedule**:
    - **Location**: TTW Classroom, 5419

    - **Time and Date**: Mondays, 12PM - Next meeting February 10, 2025
    - **Frequency**: Quarterly
- **Agenda Posting**: DRC Office Window (5400 building)

Fine Arts & Communication (FAC) Division Curriculum Committee

- **Chair(s)**: Jordan Fong, Cynthia Brannvall
- **Voting Members**: Jordan Fong, Cynthia Brannvall (all FAC faculty are encouraged to tender advisory votes)
- **Quorum Requirements**: 2 voting members
- **Meeting Schedule**:
    - **Location**: Room 1801, or via Zoom
    - **Time and Date**: 2pm-3pm, every other Tuesday
    - **Frequency**: Biweekly
- **Agenda Posting**: Posted on the front window of the FAC Division office, Rm 1701

Health Sciences & Horticulture (HSH) Division Curriculum Committee

- **Chair(s):** Rachelle Campbell, Cathy Draper, Shaelyn St. Onge-Cole
- **Voting Members:** All HSH faculty members have voting privileges
- **Quorum Requirements:** 6 voting members
- **Meeting Schedule:**
    - **Location:** HSH Division Conference Room (5212)
    - **Time and Date:** Friday, January 24, 12:00pm – 1:00pm
    - **Frequency:** Monthly. Next meetings: 3/14, 4/18, 5/23, 6/6
- **Agenda Posting:** Agendas are posted on the HSH Division Office window, 5200 building

Kinesiology & Athletics (KA/ATHL) Division Curriculum Committee

- **Chair(s)**: Jeffrey Bissell (FT Tenure Faculty)
- **Voting Members**: Jeffrey Bissell (FT), Kelly Edwards (FT), & Rita O'Loughlin (FT)
- **Quorum Requirements**: 2
- **Meeting Schedule**:
    - **Location**: Foothill Fitness Center, Rm 2509
    - **Time and Date:** 12:30pm, 3rd Thursdays
    - **Frequency**: Monthly
- **Agenda Posting**: Agenda posted 1 week before meeting in the window of KA/ATHL main office, Rm 2711

Language Arts (LA) Division Curriculum Committee

- **Chair(s)**: Amy Sarver; projected tenure through the 2024-25 AY.
- **Voting Members**: Rachael Dworsky, Ulysses Acevedo, Patricia Crespo-Martin, Julio Rivera-Montanez, Amy Sarver
- **Quorum Requirements**: 2 voting members
- **Meeting Schedule**:
    - **Location**: TBD

    - **Time and Date**: 11:00a.m. 8th week of every quarter (2/28; 5/30)
    - **Frequency**: Quarterly
- **Agenda Posting**: Posted on the bulletin boards near the 6000s bathrooms

Learning Resource Center (LRC) Division Curriculum Committee

- **Chair(s)**: Micaela Agyare (Library, Fall 24, Winter 25), Laura Gamez (Library, Spring 25), Katie Ha (Tutoring, Spring 25), Eric Reed (Tutoring, Fall 24, Winter 25)
- **Voting Members**: Micaela Agyare, Eric Reed *(all LRC faculty are encouraged to tender advisory votes)*
- **Quorum Requirements**: 2
- **Meeting Schedule**:
    - **Location**: Library Conference Room 3533
    - **Time and Date**: next meeting 6/17/25 11am-12pm
    - **Frequency**: Quarterly
- **Agenda Posting**: Posted on the window of the Library Conference Room, 3533

Science, Technology, Engineering & Math (STEM) Division Curriculum Committee

- **Chair(s)**: n/a
- **Voting Members**: Kyle Taylor, Robert Sandor
- **Quorum Requirements**: Simple majority of the voting members
- **Meeting Schedule**:
    - **Location:** PSEC 4409
    - **Time and Date:** Tuesdays 2:00 - 3:30 PM
    - **Frequency:** Every other week (when CCC is not meeting)
- **Agenda Posting**: Outside the STEM Division Office

EMS F060C : EMERGENCY MEDICINE SEMINAR I

Proposal Type
New Course

Effective Term
Summer 2025

Subject
Emergency Medical Services (EMT/EMR/Paramedic) (EMS)

Course Number
F060C

Department
Emergency Medical Services (EMT/EMR/Paramedic) (EMS)

Division
Health Sciences and Horticulture (1BH)

Units
1.5

Former ID

Cross Listed

Related Courses

Maximum Units
1.5

Does this course meet on a weekly basis?
Yes

Weekly Lecture Hours
1.5

Weekly Lab Hours
0

Weekly Out of Class Hours
3

Special Hourly Notation

Total Contact Hours
18

Total Student Learning Hours
54

Repeatability Statement
Not Repeatable

Credit Status
Credit

Degree Status
Applicable

Is Basic Skills applicable to this course?
No

Grading
Letter Grade Only

Will credit by exam be allowed for this course?
No

Honors
No

Degree or Certificate Requirement
None of the above (Stand Alone course)

Stand Alone

If a Foothill credit course is not part of a state-approved associate's degree, certificate of achievement, or the Foothill GE pattern, it is considered by the state to be a "Stand Alone Course." Per Title 5, local curriculum committees must review and approve proposed Stand Alone courses to ensure that they are consistent with credit course standards (§55002), the community college mission, and that there is sufficient need and resources for the course. To be compliant with state regulations, there must be a completed, approved Stand Alone form on file in the Office of Instruction. Per our local process, the same process of review and approval is used for noncredit Stand Alone courses.

Are you requesting Stand Alone approval for the course on a temporary or permanent basis?

• Temporary means the course will be incorporated into a new degree or certificate that is not yet State approved.
• Permanent means there are no plans to add the course to a State approved degree or certificate, nor to the Foothill GE pattern.

Please select
Permanent

The Curriculum Committee must evaluate this application based on the following criteria:

Criteria A. Appropriateness to Mission

The Foothill College Mission states: Believing a well-educated population is essential to sustaining and enhancing a democratic society, 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. We work to obtain equity in achievement of student outcomes for all California student populations, and are guided by our core values of honesty, integrity, trust, openness, transparency, forgiveness, and sustainability. Foothill College offers associate degrees and certificates in multiple disciplines, and a baccalaureate degree in dental hygiene.

Please indicate how your course supports the Foothill College Mission:
Workforce/CTE

Criteria B. Need

A course may only be granted Stand Alone Approval if there is demonstrable need for the course in the college service area. Please provide evidence of the need or demand for your course, such as ASSIST documentation for transfer courses or Labor Market Information for workforce/CTE courses (if LMI is unavailable, advisory board minutes or employer surveys may be submitted). For basic skills courses, assessment-related data or information may be provided. Evidence may be provided in the box below and/or uploaded as an attachment.

Evidence
This course functions as a supportive offering within the Paramedic Program, supplementing the core curriculum by enhancing students' critical thinking, clinical decision-making, patient assessment, and specialty care knowledge based on evolving workforce expectations. Taught by the Paramedic Program's Medical Director, the course ensures that content aligns with current medical standards and complies with CoAEMSP/CAAHEP Standard III.B.2.a, which requires the Medical Director to review and approve all educational content and engage directly with the program and students. Additionally, the course's emphasis on equity, inclusion, and compassionate care aligns with Foothill College's mission to promote student success in the healthcare field.

Attach evidence
Medical Director Responsibilities.pdf

Need/Justification
This course functions as a supportive offering within the Paramedic Program, supplementing the core curriculum by enhancing students' critical thinking, clinical decision-making, patient assessment, and specialty care knowledge based on evolving workforce expectations. Students who complete the program in a satisfactory manner are qualified to apply for state paramedic licensure.

Course Description
This course enriches the core curriculum of respiratory and cardiovascular emergencies in emergency medicine, emphasizing principles of equity and inclusivity. Through a combination of lectures, practical applications, and assessments, students will gain

comprehensive insights into advanced emergency medicine. This includes enhancing their skills in patient evaluation and management across diverse populations in the prehospital and hospital settings. Intended for students in the Paramedic Program; enrollment is limited to students accepted in the program.

Course Prerequisites

Course Corequisites

Course Advisories

Course Objectives
The student will be able to:

1. Demonstrate an understanding of the history and evolution of diverse aspects of emergency medicine
2. Analyze and discuss various aspects of airway management
3. Demonstrate an understanding of critical respiratory emergencies found in the emergency setting
4. Distinguish the four types of shock
5. Identify and analyze the diverse etiologies of chest pain
6. Demonstrate an understanding of cardiovascular emergencies found in the prehospital setting
7. Analyze and interpret 12-lead electrocardiogram rhythms

Course Content

1. History of emergency medicine
    1. Overview of emergency medicine
    2. Prehospital to emergency department patient transfer of care
    3. Patient evaluation
2. Airway management
    1. Airway adjuncts including oropharyngeal and nasopharyngeal adjuncts
    2. Continuous positive airway pressure ventilation (CPAP)
    3. Endotracheal intubation
3. Respiratory emergencies
    1. Acute congestive heart failure (CHF)
    2. Chronic obstructive pulmonary disease (COPD)
    3. Anaphylaxis
    4. Pneumonia
    5. Asthma exacerbation
    6. Acute pulmonary embolism
4. Shock
    1. Hypovolemic
    2. Cardiogenic
    3. Distributive

4. Obstructive
5. Chest pain
    1. Cardiac
    2. Pulmonary
    3. Gastrointestinal
    4. Musculoskeletal
    5. Psychogenic
6. Cardiovascular emergencies
    1. Acute coronary syndrome
        1. Unstable angina
        2. Non-ST-elevation acute coronary syndrome (NSTE-ACS)
        3. ST-elevation myocardial infarction (STEMI)
    2. Narrow and wide complex electrocardiogram (ECG) rhythms
    3. Heart blocks, including first degree, second degree, and complete
7. 12-lead electrocardiogram
    1. Electrode placement
    2. Anatomical views of each lead
    3. Components of the ECG waveform
    4. Myocardial ischemia and arrhythmias

Lab Content
Not applicable.

Special Facilities and/or Equipment
1. Smart classroom with audio visual equipment
2. Emergency medical equipment

Methods of Evaluation

Methods of Evaluation may include but are not limited to the following:
Written tests
Case studies
Class participation

Methods of Instruction

Methods of Instruction may include but are not limited to the following:
Interactive lecture/presentations
In-class reading assignments, including but not limited to handout material relative to class lecture
In-class projects, e.g., scenarios for critical thinking

Representative Text(s)

Please provide justification for any texts that are older than 5 years

Other Materials
No required textbook. Handout materials and online resources (documents, presentation slides, web links, images, videos) will be provided by the instructor and/or presenter(s).

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Reading assignments from online sources, class handouts, and other various sources, ranging from 5-15 pages per week.
2. Written short answer essay questions and take home assignments.

Authorized Discipline(s):
Emergency Medical Technologies

Faculty Service Area (FSA Code)
HEALTH CARE SERVICES

Taxonomy of Program Code (TOP Code)
*1251.00 - Paramedic

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Please describe how you have incorporated principles of equity during this revision:
June 2024: The knowledge and skillset of this course focuses on preparing the student in providing compassionate, impartial patient centered care across the lifespan to a wide range of socioeconomic groups. This course promotes student success within the program and in their career.

Articulation Office Only

C-ID Notation

Transferability
CSU

Validation Date
11/19/24

Division Dean Only

Seat Count
36

Load
.033

FOAP Codes:

Fund Code
114000 - General Operating- Unrestricted

Org Code
141081 - Emergency Med Tech/Paramedic (EMTP)

Account Code
1320

Program Code
125100 - Paramedic

EMS F061C : EMERGENCY MEDICINE SEMINAR II

Proposal Type
New Course

Effective Term
Summer 2025

Subject
Emergency Medical Services (EMT/EMR/Paramedic) (EMS)

Course Number
F061C

Department
Emergency Medical Services (EMT/EMR/Paramedic) (EMS)

Division
Health Sciences and Horticulture (1BH)

Units
1.5

Former ID

Cross Listed

Related Courses

Maximum Units
1.5

Does this course meet on a weekly basis?
Yes

Weekly Lecture Hours
1.5

Weekly Lab Hours
0

Weekly Out of Class Hours
3

Special Hourly Notation

Total Contact Hours
18

Total Student Learning Hours
54

Repeatability Statement
Not Repeatable

Credit Status
Credit

Degree Status
Applicable

Is Basic Skills applicable to this course?
No

Grading
Letter Grade Only

Will credit by exam be allowed for this course?
No

Honors
No

Degree or Certificate Requirement
None of the above (Stand Alone course)

Stand Alone

If a Foothill credit course is not part of a state-approved associate's degree, certificate of achievement, or the Foothill GE pattern, it is considered by the state to be a "Stand Alone Course." Per Title 5, local curriculum committees must review and approve proposed Stand Alone courses to ensure that they are consistent with credit course standards (§55002), the community college mission, and that there is sufficient need and resources for the course. To be compliant with state regulations, there must be a completed, approved Stand Alone form on file in the Office of Instruction. Per our local process, the same process of review and approval is used for noncredit Stand Alone courses.

Are you requesting Stand Alone approval for the course on a temporary or permanent basis?

• Temporary means the course will be incorporated into a new degree or certificate that is not yet State approved.
• Permanent means there are no plans to add the course to a State approved degree or certificate, nor to the Foothill GE pattern.

Please select
Permanent

The Curriculum Committee must evaluate this application based on the following criteria:

Criteria A. Appropriateness to Mission

The Foothill College Mission states: Believing a well-educated population is essential to sustaining and enhancing a democratic society, 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. We work to obtain equity in achievement of student outcomes for all California student populations, and are guided by our core values of honesty, integrity, trust, openness, transparency, forgiveness, and sustainability. Foothill College offers associate degrees and certificates in multiple disciplines, and a baccalaureate degree in dental hygiene.

Please indicate how your course supports the Foothill College Mission:
Workforce/CTE

Criteria B. Need

A course may only be granted Stand Alone Approval if there is demonstrable need for the course in the college service area. Please provide evidence of the need or demand for your course, such as ASSIST documentation for transfer courses or Labor Market Information for workforce/CTE courses (if LMI is unavailable, advisory board minutes or employer surveys may be submitted). For basic skills courses, assessment-related data or information may be provided. Evidence may be provided in the box below and/or uploaded as an attachment.

Evidence
This course functions as a supportive offering within the Paramedic Program, supplementing the core curriculum by enhancing students' critical thinking, clinical decision-making, patient assessment, and specialty care knowledge based on evolving workforce expectations. Taught by the Paramedic Program's Medical Director, the course ensures that content aligns with current medical standards and complies with CoAEMSP/CAAHEP Standard III.B.2.a, which requires the Medical Director to review and approve all educational content and engage directly with the program and students. Additionally, the course's emphasis on equity, inclusion, and compassionate care aligns with Foothill College's mission to promote student success in the healthcare field.

Attach evidence
Medical Director Responsibilities.pdf

Need/Justification
This course functions as a supportive offering within the Paramedic Program, supplementing the core curriculum by enhancing students' critical thinking, clinical decision-making, patient assessment, and specialty care knowledge based on evolving workforce expectations. Students who complete the program in a satisfactory manner are qualified to apply for state paramedic licensure.

Course Description
Continuation of EMS 60C. This course enriches the core curriculum involving the management of various medical and psychiatric emergencies. The course continues the examination of cardiac care, focusing on advanced cardiac life support (ACLS) using case

studies to provide a deeper understanding of the different treatment and protocols, emphasizing principles of equity and inclusivity. Through a combination of lectures, practical applications, case studies, and assessments, students will gain comprehensive insights into advanced emergency medicine. This includes enhancing their skills in patient evaluation and management across diverse populations in the prehospital and hospital settings. Intended for students in the Paramedic Program; enrollment is limited to students accepted in the program.

Course Prerequisites

Course Corequisites

Course Advisories

Course Objectives
The student will be able to:

1. Demonstrate an in-depth understanding of the various endocrine emergencies found in the prehospital and hospital setting
2. Evaluate and analyze the significant neurologic emergencies affecting diverse patient populations in the prehospital and hospital setting
3. Examine the key renal and genitourinary emergencies
4. Demonstrate proficiency in assessing altered mental status
5. Implement an understanding of immunologic emergencies
6. Evaluate the significant ear, nose, and throat emergencies
7. Demonstrate an understanding of psychiatric emergencies across a diverse patient population
8. Analyze the various toxicologic emergencies in the prehospital setting

Course Content

1. Endocrine emergencies
    1. Diabetic emergencies overview
    2. Diabetic ketoacidosis
    3. Hyperosmolar hyperglycemic state (HHS)
    4. Adrenal crisis
2. Neurologic emergencies
    1. Stroke and transient ischemic attacks (TIA)
    2. Seizures
    3. Head trauma
3. Renal and genitourinary emergencies
    1. Pyelonephritis
    2. Urinary tract infection (UTI) with sepsis
    3. Urosepsis
    4. Kidney/ureteral stones
    5. Renal failure

4. Altered mental status
    1. Alcohol use
    2. Epilepsy
    3. Insulin overdose
    4. Overdose
    5. Uremia
    6. Trauma
    7. Infection
    8. Psychosis
5. Immunologic emergencies
    1. Allergic reaction
    2. Anaphylaxis
6. Ear, nose, and throat emergencies
    1. Ear emergencies
        1. Acute otitis media
        2. Traumatic ear injury
    2. Nose emergencies
        1. Epitaxis
        2. Nasal fractures
        3. Foreign body in nose
    3. Throat emergencies
        1. Epiglotitis
        2. Esophageal obstruction
        3. Peritonsillar abscesses
7. Psychiatric emergencies
    1. Acute psychosis
    2. Severe depression
    3. Bipolar disorder
8. Toxicologic emergencies
    1. Carbon monoxide poisoning
    2. Drug overdose
    3. Alcohol intoxication and withdrawal
    4. Exposure to hazardous materials

Lab Content
Not applicable.

Special Facilities and/or Equipment
1. Smart classroom with audio visual equipment
2. Emergency medical equipment

Methods of Evaluation

Methods of Evaluation may include but are not limited to the following:
Written tests
Case studies
Class participation

Methods of Instruction

Methods of Instruction may include but are not limited to the following:
Interactive lecture/presentations
In-class reading assignments, including but not limited to handout material relative to class lecture
In-class projects, e.g., scenarios for critical thinking

Representative Text(s)

Please provide justification for any texts that are older than 5 years

Other Materials
No required textbook. Handout materials and online resources (documents, presentation slides, web links, images, videos) will be provided by the instructor and/or presenter(s).

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Reading assignments from online sources, class handouts, and other various sources, ranging from 5-15 pages per week.
2. Written short answer essay questions and take home assignments.

Authorized Discipline(s):
Emergency Medical Technologies

Faculty Service Area (FSA Code)
HEALTH CARE SERVICES

Taxonomy of Program Code (TOP Code)
*1251.00 - Paramedic

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Please describe how you have incorporated principles of equity during this revision:
June 2024: The knowledge and skillset of this course focuses on preparing the student in providing compassionate, impartial patient centered care across the lifespan to a wide range of socioeconomic groups. This course promotes student success within the program and in their career.

Articulation Office Only

C-ID Notation

Transferability
CSU

Validation Date
11/19/24

Division Dean Only

Seat Count
36

Load
.033

FOAP Codes:

Fund Code
114000 - General Operating- Unrestricted

Org Code
141081 - Emergency Med Tech/Paramedic (EMTP)

Account Code
1320

Program Code
125100 - Paramedic

EMS F062C : EMERGENCY MEDICINE SEMINAR III

Proposal Type
New Course

Effective Term
Summer 2025

Subject
Emergency Medical Services (EMT/EMR/Paramedic) (EMS)

Course Number
F062C

Department
Emergency Medical Services (EMT/EMR/Paramedic) (EMS)

Division
Health Sciences and Horticulture (1BH)

Units
1.5

Former ID

Cross Listed

Related Courses

Maximum Units
1.5

Does this course meet on a weekly basis?
Yes

Weekly Lecture Hours
1.5

Weekly Lab Hours
0

Weekly Out of Class Hours
3

Special Hourly Notation

Total Contact Hours
18

Total Student Learning Hours
54

Repeatability Statement
Not Repeatable

Credit Status
Credit

Degree Status
Applicable

Is Basic Skills applicable to this course?
No

Grading
Letter Grade Only

Will credit by exam be allowed for this course?
No

Honors
No

Degree or Certificate Requirement
None of the above (Stand Alone course)

Stand Alone

If a Foothill credit course is not part of a state-approved associate's degree, certificate of achievement, or the Foothill GE pattern, it is considered by the state to be a "Stand Alone Course." Per Title 5, local curriculum committees must review and approve proposed Stand Alone courses to ensure that they are consistent with credit course standards (§55002), the community college mission, and that there is sufficient need and resources for the course. To be compliant with state regulations, there must be a completed, approved Stand Alone form on file in the Office of Instruction. Per our local process, the same process of review and approval is used for noncredit Stand Alone courses.

Are you requesting Stand Alone approval for the course on a temporary or permanent basis?

• Temporary means the course will be incorporated into a new degree or certificate that is not yet State approved.
• Permanent means there are no plans to add the course to a State approved degree or certificate, nor to the Foothill GE pattern.

Please select
Permanent

The Curriculum Committee must evaluate this application based on the following criteria:

Criteria A. Appropriateness to Mission

The Foothill College Mission states: Believing a well-educated population is essential to sustaining and enhancing a democratic society, 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. We work to obtain equity in achievement of student outcomes for all California student populations, and are guided by our core values of honesty, integrity, trust, openness, transparency, forgiveness, and sustainability. Foothill College offers associate degrees and certificates in multiple disciplines, and a baccalaureate degree in dental hygiene.

Please indicate how your course supports the Foothill College Mission:
Workforce/CTE

Criteria B. Need

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Evidence
This course functions as a supportive offering within the Paramedic Program, supplementing the core curriculum by enhancing students' critical thinking, clinical decision-making, patient assessment, and specialty care knowledge based on evolving workforce expectations. Taught by the Paramedic Program's Medical Director, the course ensures that content aligns with current medical standards and complies with CoAEMSP/CAAHEP Standard III.B.2.a, which requires the Medical Director to review and approve all educational content and engage directly with the program and students. Additionally, the course's emphasis on equity, inclusion, and compassionate care aligns with Foothill College's mission to promote student success in the healthcare field.

Attach evidence
Medical Director Responsibilities.pdf

Need/Justification
This course functions as a supportive offering within the Paramedic Program, supplementing the core curriculum by enhancing students' critical thinking, clinical decision-making, patient assessment, and specialty care knowledge based on evolving workforce expectations. Students who complete the program in a satisfactory manner are qualified to apply for state paramedic licensure.

Course Description
Continuation of EMS 61C. This course enriches the core curriculum of gynecologic, obstetrical, and neonatal resuscitation, pediatric, geriatric, environmental, and trauma emergencies in emergency medicine, emphasizing principles of equity and inclusion.

Through a combination of lectures, practical applications, case studies, and assessments, students will gain comprehensive insights into advanced emergency medicine. This includes enhancing their skills in patient evaluation and management across diverse populations in the prehospital and hospital settings. Intended for students in the Paramedic Program; enrollment is limited to students accepted in the program.

Course Prerequisites

Course Corequisites

Course Advisories

Course Objectives
The student will be able to:

1. Demonstrate an understanding of gynecological emergencies found in the prehospital and hospital setting
2. Exhibit comprehension of the key obstetrical and neonatal emergencies
3. Evaluate and analyze the various pediatric emergencies of diverse patient populations
4. Examine and analyze the different emergencies involving geriatric patients
5. Evaluate the key environmental emergencies
6. Recognize and evaluate the different trauma emergencies

Course Content

1. Gynecologic emergencies
    1. Pelvic inflammatory disease (PID)
    2. Ruptured ovarian cyst
    3. Dysmenorrhea
    4. Abortion/miscarriage
    5. Sexually transmitted diseases
2. Obstetrical emergencies
    1. Placenta abruption
    2. Ectopic pregnancy
    3. Placenta previa
    4. Uterine rupture
    5. Preeclampsia/eclampsia
    6. Postpartum hemorrhage
3. Neonatal resuscitation
    1. Initial steps and assessment
    2. Ventilation
    3. Chest compressions
    4. Medications
    5. Post-resuscitation care
4. Pediatric emergencies

        1. Respiratory
        2. Cardiovascular
        3. Neurological
        4. Gastrointestinal
        5. Endocrine
        6. Hematological
        7. Infectious
        8. Traumatic
        9. Immunologic
        10. Environmental
        11. Psychiatric
    5. Geriatric emergencies
        1. Respiratory
        2. Cardiovascular
        3. Endocrine
        4. Gastrointestinal
        5. Genitourinary
        6. Endocrine
        7. Traumatic
        8. Infectious
        9. Fluid and electrolyte disorders
        10. Psychiatric
    6. Environmental emergencies
        1. Heat related
        2. Cold related
        3. Electric shock
        4. Biological
        5. Near drowning and drowning
    7. Trauma emergencies
        1. Soft tissue and bleeding control
        2. Orthopedic
        3. Abdominal
        4. Head and spinal

Lab Content
Not applicable.

Special Facilities and/or Equipment
1. Smart classroom, with audio visual equipment
2. Emergency medical equipment

Methods of Evaluation

Methods of Evaluation may include but are not limited to the following:
Written tests
Case studies
Class participation

Methods of Instruction

Methods of Instruction may include but are not limited to the following:
Interactive lecture/presentations
In-class reading assignments, including but not limited to handout material relative to class lecture
In-class projects, e.g., scenarios for critical thinking

Representative Text(s)

Please provide justification for any texts that are older than 5 years

Other Materials
No required textbook. Handout materials and online resources (documents, presentation slides, web links, images, videos) will be provided by the instructor and/or presenter(s).

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Reading assignments from online sources, class handouts, and other various sources, ranging from 5-15 pages per week.
2. Written short answer essay questions and take home assignments.

Authorized Discipline(s):
Emergency Medical Technologies

Faculty Service Area (FSA Code)
HEALTH CARE SERVICES

Taxonomy of Program Code (TOP Code)
*1251.00 - Paramedic

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Articulation Office Only

C-ID Notation

Transferability
CSU

Validation Date
11/19/24

Division Dean Only

Seat Count
36

Load
.033

FOAP Codes:

Fund Code
114000 - General Operating- Unrestricted

Org Code
141081 - Emergency Med Tech/Paramedic (EMTP)

Account Code
1320

Program Code
125100 - Paramedic

Standard III.B.2.a. Medical Director Responsibilities

The medical director must be responsible for medical oversight of the program, including but not limited to

1) Review and approve the educational content of the program to include didactic, laboratory, clinical experience, field experience, and capstone field to ensure it meets current standards of medical practice;

2) Review and approve the required minimum numbers for each of the required patient contacts and procedures listed in these Standards;

3) Review and approve the instruments and processes used to evaluate students in didactic, laboratory, clinical, field experience, and capstone field internship;

4) Review the progress of each student throughout the program, and assist in the determination of appropriate corrective measures;

It is recommended that corrective measures occur in the cases of failing academic or clinical or field internship performance.

5) Ensure the competence of each graduate of the program in the cognitive, psychomotor, and affective domains;

6) Engage in cooperative involvement with the program director; and

7) Ensure the effectiveness and quality of any Medical Director responsibilities delegated to an Associate or Assistant Medical Director.

It is recommended that the Medical Director interaction be in a variety of settings, such as lecture, laboratory, clinical, capstone field internship. Interaction may be by synchronous electronic methods.

Interpretation of Compliance with the Standard:

There is written documentation that the Medical Director fulfills each of the responsibilities:

1) Documentation can include a signed document stating the nature of review activities including dates conducted.

2) There is evidence of interaction between the Medical Director and the students.

3) Documentation includes a terminal competency form for each graduate signed and dated by the Medical Director at the completion of the program. There is a form for each student and not the entire cohort. A CoAEMSP Terminal Competency form is available on the CoAEMSP website for use by the program, if desired.

The terminal competency form for each student contains a dated original signature by the Medical Director. A stamped signature is not acceptable. A secure electronic signature is acceptable.

A secure electronic signature is not *a jpeg or other type of image inserted into a document. A secure electronic signature is unique and under the sole control of the individual signing the document, The technology identifies if the document was changed in any way after the electronic signature was applied.*

If the CoAEMSP form is not used, the program's terminal competency form includes the following statement: "We hereby attest that the candidate listed below successfully completed all of the terminal competencies required for graduation from the [AEMT or Paramedic] Education program as a

NCAL F419J : AUDITIONING FOR THEATRE FOR OLDER ADULTS

Proposal Type
New Course

Effective Term
Summer 2025

Subject
Non-Credit: Adult Learning (NCAL)

Course Number
F419J

Department
Theatre Arts (THTR)

Division
Fine Arts and Communication (1FA)

Units
0

Former ID

Cross Listed

Related Courses
THTR F022. - AUDITIONING FOR THEATRE

Maximum Units
0

Does this course meet on a weekly basis?
Yes

Weekly Lecture Hours
2

Weekly Lab Hours
0

Weekly Out of Class Hours
4

Special Hourly Notation

Total Contact Hours
24

Total Student Learning Hours
72

Repeatability Statement
Unlimited Repeatability

Repeatability Criteria
Noncredit course for older adults.

Credit Status
Non-Credit

Degree Status
Non-Applicable

Is Basic Skills applicable to this course?
No

Grading
Non-Credit Course (Receives no Grade)

Will credit by exam be allowed for this course?
No

Honors
No

Degree or Certificate Requirement
None of the above (Stand Alone course)

Stand Alone

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Are you requesting Stand Alone approval for the course on a temporary or permanent basis?

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• Permanent means there are no plans to add the course to a State approved degree or certificate, nor to the Foothill GE pattern.

Please select
Permanent

The Curriculum Committee must evaluate this application based on the following criteria:

Criteria A. Appropriateness to Mission

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Please indicate how your course supports the Foothill College Mission:
Transfer

Criteria B. Need

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Evidence
Noncredit course for older adults.

Attach evidence

Need/Justification
This course prepares students for a career in the Theatre Arts.

Course Description
This noncredit course is targeted towards older adults. Students will be introduced to a variety of auditioning scenarios and strategies. With a focus on stage techniques, the course will explore the practical application of audition theories. Topics will include monologues for general auditions, building a repertoire, preparing video auditions, strategies for cold readings and improvisation situations. Students will be introduced to theories of preparation and etiquette as well as the use of informational resources.

Course Prerequisites

Course Corequisites

Course Advisories
Advisory: THTR 20A or equivalent.

Course Objectives
The student will be able to:

1. Perceive and apply the psychology of the audition process from the perspectives of actor, director, casting director.
2. Recognize and respond appropriately to the various audition formats used in theatre, film and television.
3. Prepare and perform appropriate audition selections drawn from dramatic literature.
4. Develop a working resume and appropriately consider the function of industry photography as it relates to self-promotion.
5. Understand and apply the precepts of traditional and "non-traditional" casting issues, as they relate to contemporary employment prospects.

Course Content

Students will experience, encounter and practically engage:

1. Strategies for approaching cold and prepared reading audition situations
2. Strategies for approaching improvisational audition situations
3. Preparation for a general audition situation including memorized monologues or songs
    1. Two modern performance pieces of appropriate length
        1. Serious
        2. Comic
        3. Two classical performance pieces of appropriate length
            1. Comic
            2. Serious
4. Development of an industry appropriate resume with photographs
    1. Research of industry resources for employment opportunities
    2. Concepts of self-marketing appropriate for the industry
5. Research and discuss industry casting trends of both professional, semi-professional and community companies with the assistance of industry professional guests where applicable

Lab Content
Not applicable.

Special Facilities and/or Equipment
1. Rehearsal clothing, changing rooms.
2. Play scripts as required.
3. A rehearsal studio with an unobstructed, flat floor approximately 30' x 40' for rehearsal and simulated auditions.
4. Video recording and playback equipment.

5. College library dramatic literature collection.
6. For online instruction, regular weekly internet access for online content.

Methods of Evaluation

Methods of Evaluation may include but are not limited to the following:
Public presentation of monologues
Resume preparation and scrutiny
Quizzes of introduced class elements
Participation in developmental in-class activities

Methods of Instruction

Methods of Instruction may include but are not limited to the following:
Lecture
Discussion
Cooperative learning exercises
Oral presentations
Demonstration
Field trips
Performances
Observation
Video recording and critique

Representative Text(s)

Author(s)	Title	Publication Date
Shurtleff, Michael	Audition	2003

Please provide justification for any texts that are older than 5 years
Although this text is older than the suggested "5 years or newer" standard, it remains a seminal text in this area of study.

Other Materials
Additional play scripts, anthologies and scene books assigned on an individual basis

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Preparation of industry suitable resume
2. Individually assigned play scripts
3. Journal of self-reflection

Authorized Discipline(s):
Theater Arts

Faculty Service Area (FSA Code)
DRAMA/THEATER ARTS

Taxonomy of Program Code (TOP Code)
1007.00 - Dramatic Arts

Foothill faculty, through our Academic Senate and Curriculum Committee, ask you to consider the Guiding Principles for Equitable CORs document (available at https://foothill.edu/curriculum/process.html) while creating or revising this COR.

Please describe how you have incorporated principles of equity during this revision:
April 2024: Identified as fundamentally sound for equity based principles.

Articulation Office Only

C-ID Notation

Transferability
None

Validation Date

Division Dean Only

Seat Count
30

Load
.030

FOAP Codes:

Fund Code
114000 - General Operating- Unrestricted

Org Code
143101 - Theatre Arts

Account Code
1320

Program Code
100700 - Dramatic Arts

NCAL F419K : READERS THEATRE FOR OLDER ADULTS

Proposal Type
New Course

Effective Term
Summer 2025

Subject
Non-Credit: Adult Learning (NCAL)

Course Number
F419K

Department
Theatre Arts (THTR)

Division
Fine Arts and Communication (1FA)

Units
0

Former ID

Cross Listed

Related Courses
THTR F024. - READERS THEATRE

Maximum Units
0

Does this course meet on a weekly basis?
Yes

Weekly Lecture Hours
3

Weekly Lab Hours
3

Weekly Out of Class Hours
6

Special Hourly Notation

Total Contact Hours
72

Total Student Learning Hours
144

Repeatability Statement
Unlimited Repeatability

Repeatability Criteria
Noncredit course for older adults.

Credit Status
Non-Credit

Degree Status
Non-Applicable

Is Basic Skills applicable to this course?
No

Grading
Non-Credit Course (Receives no Grade)

Will credit by exam be allowed for this course?
No

Honors
No

Degree or Certificate Requirement
None of the above (Stand Alone course)

Stand Alone

If a Foothill credit course is not part of a state-approved associate's degree, certificate of achievement, or the Foothill GE pattern, it is considered by the state to be a "Stand Alone Course." Per Title 5, local curriculum committees must review and approve proposed Stand Alone courses to ensure that they are consistent with credit course standards (§55002), the community college mission, and that there is sufficient need and resources for the course. To be compliant with state regulations, there must be a completed, approved Stand Alone form on file in the Office of Instruction. Per our local process, the same process of review and approval is used for noncredit Stand Alone courses.

Are you requesting Stand Alone approval for the course on a temporary or permanent basis?

• Temporary means the course will be incorporated into a new degree or certificate that is not yet State approved.
• Permanent means there are no plans to add the course to a State approved degree or certificate, nor to the Foothill GE pattern.

Please select
Permanent

The Curriculum Committee must evaluate this application based on the following criteria:

Criteria A. Appropriateness to Mission

The Foothill College Mission states: Believing a well-educated population is essential to sustaining and enhancing a democratic society, 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. We work to obtain equity in achievement of student outcomes for all California student populations, and are guided by our core values of honesty, integrity, trust, openness, transparency, forgiveness, and sustainability. Foothill College offers associate degrees and certificates in multiple disciplines, and a baccalaureate degree in dental hygiene.

Please indicate how your course supports the Foothill College Mission:
Transfer

Criteria B. Need

A course may only be granted Stand Alone Approval if there is demonstrable need for the course in the college service area. Please provide evidence of the need or demand for your course, such as ASSIST documentation for transfer courses or Labor Market Information for workforce/CTE courses (if LMI is unavailable, advisory board minutes or employer surveys may be submitted). For basic skills courses, assessment-related data or information may be provided. Evidence may be provided in the box below and/or uploaded as an attachment.

Evidence
Noncredit course for older adults.

Attach evidence

Need/Justification
This course prepares Theatre Arts students and practitioners for entry into the local and regional pool of performing artists.

Course Description
This noncredit course is targeted towards older adults. Preparation and performance of individual and group readings from various types of literature, especially play scripts, employing a range of vocal skills, and presented in a dramatic context.

Course Prerequisites

Course Corequisites

Course Advisories
Advisory: Recommend successful completion of THTR 20A or equivalent.

Course Objectives
The student will be able to:

1. Select, prepare, deliver and critique monologue, dialogue, and choral readings from various types and genres of literature, with increasing levels of sophistication.
2. Apply a variety of fundamental vocal techniques to literature selected.
3. Identify and synthesize a selection of literary materials into a coherent, unified dramatic presentation.
4. Distinguish and demonstrate processes of transforming non-dramatic materials into a dramatic context.
5. Recognize and differentiate between the forms of oral interpretation, readers theatre and "acted" oral work.
6. Value dramatic literature from historically rich and diverse multi-ethic and multi-cultural sources.
7. Recognize the interdisciplinary nature of readers theatre, combining literature of many genres, music, and humanities.

Course Content

1. Exposure to various samples of readers theatre
2. Conscious attention to multi-cultural sources of literature
3. Lecture presentations regarding form and style of readers theatre processes
4. Minimum of four dramatic readings each quarter
5. Participation in rehearsal and performance of a readers theatre production composed around an organizing principle:
    1. One author's works
    2. A particular literary genre, e.g., poetry, drama, narrative
    3. A single major work
    4. Thematic organization
    5. Literature exploring a specific cultural or ethnic source
6. Fundamental vocal exercises
    1. Articulation
    2. Projection
    3. Expressive skills
    4. Sight reading

Lab Content

1. Cooperative rehearsal of class assignments and projects.
2. Individual and partner exploration and self-analysis of concepts and exercises introduced in class.

Special Facilities and/or Equipment
1. Reading stands, room with theatre-style seating for performance.
2. For online instruction, regular weekly internet access for online content.

Methods of Evaluation

Methods of Evaluation may include but are not limited to the following:
Graded class reading assignments
Written assembly and analysis of literary materials
Final group reading project

Methods of Instruction

Methods of Instruction may include but are not limited to the following:
Lecture
Discussion
Cooperative learning exercises
Oral presentations
Laboratory
Demonstration

Representative Text(s)

Author(s)	Title	Publication Date
Kleinau, Marion L., and Janet Larsen McHughes	Theatres for Literature	2003
Yordon, Judy	Experimental Theatre: Creating and Staging Texts	2001

Please provide justification for any texts that are older than 5 years
Although these texts are older than the suggested "5 years or newer" standard, they remain seminal texts in this area of study.

Other Materials
Literature and play scripts selected to assure exposure to the best classical and contemporary material

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Selected play scripts and appropriate background reading as assigned by the instructor each quarter. The play scripts chosen each term will not repeat within a minimum of five years. Additional texts are chosen based on the specific performance projects.

Authorized Discipline(s):
Theater Arts

Faculty Service Area (FSA Code)
DRAMA/THEATER ARTS

Taxonomy of Program Code (TOP Code)
1007.00 - Dramatic Arts

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April 2024: Identified as fundamentally sound for equity based principles.

Articulation Office Only

C-ID Notation

Transferability
None

Validation Date

Division Dean Only

Seat Count
30

Load
.091

FOAP Codes:

Fund Code
114000 - General Operating- Unrestricted

Org Code
143101 - Theatre Arts

Account Code
1320

Program Code
100700 - Dramatic Arts

Semiconductor Process Engineering, AS Degree

Basic Information

Faculty Author(s)

Sarah Parikh

Department
Engineering

Division
Science Technology Engineering and Mathematics

Title of Degree/Certificate
Semiconductor Process Engineering

Type of Award
AS Degree

Workforce/CTE Program:
Yes

Effective Catalog Edition:
2024-2025

AA or AS Degree Workforce Narrative

Program Goals and Objectives
The Associate in Science Degree in Semiconductor Process Engineering will prepare students who are interested in working in the semiconductor processing industry for advancement from technician roles into engineering roles. The degree program is closely aligned with industry needs based on feedback from employers.

Program Learning Outcomes

- Students will be prepared for career advancement in semiconductor processing.
- Students will be able to apply concepts in math, science, and engineering to workplace applications in the semiconductor processing industry.

Catalog Description
The Associate in Science Degree in Semiconductor Process Engineering is for any student looking to gain foundational knowledge about how computer chips are made. The program is relevant for either students looking to enter the workforce directly or students looking to transfer into a bachelor's degree engineering program, or even students looking to explore and learn more about the world of how computers work.

Program Requirements

Core Course Units: 75

Code	Title	Units
CHEM F001A	GENERAL CHEMISTRY	5
CHEM F001B	GENERAL CHEMISTRY	5
ENGR F010.	INTRODUCTION TO ENGINEERING	5
ENGR F037.	INTRODUCTION TO CIRCUIT ANALYSIS	5
ENGR F037L	CIRCUIT ANALYSIS LABORATORY	2
ENGR F045.	PROPERTIES OF MATERIALS	5
ENGR F061A	INTRODUCTION TO SEMICONDUCTOR TECHNOLOGY	5
ENGR F061B	VACUUM SYSTEMS	5
MATH F001A	CALCULUS	5
MATH F001B	CALCULUS	5
MATH F001C	CALCULUS	5
MATH F002A	DIFFERENTIAL EQUATIONS	5
PHYS F004A	GENERAL PHYSICS (CALCULUS)	6
PHYS F004B	GENERAL PHYSICS (CALCULUS)	6
PHYS F004C	GENERAL PHYSICS (CALCULUS)	6

Total Units: 75

Proposed Sequence

Term	Units
Year 1, Fall	15
Year 1, Winter	15
Year 1, Spring	16
Year 2, Fall	11
Year 2, Winter	13
Year 2, Spring	5

Master Planning

The Associate in Science Degree in Semiconductor Process Engineering is aligned with Foothill College's mission statement regarding preparing students for the workforce in

addition to critical thinking skills and technical knowledge to be a productive member of a democratic society.

Enrollment and Completer Projections

The initial year of the two-year program will not see a large number of degrees completed; however, after the first two years it is expected that we will see 35 students complete the degree program each year. The CHIPS act has renewed energy into the local semiconductor processing industry and many companies have been working with Foothill College requesting this curriculum.

Historical Enrollment Data

Course #	Course Title	Y1 - Annual Sections	Y1 - Annual Enrollment	Y2 - Annual Sections	Y2 - Annual Enrollment
CHEM 1A	General Chemistry	16	399	15	396
CHEM 1B	General Chemistry	10	243	10	278
ENGR 10	Introduction to Engineering	2	64	2	69
ENGR 37	Introduction to Circuit Analysis	2	43	2	53
ENGR 37L	Circuit Analysis Laboratory	1	18	1	25
ENGR 45	Properties of Materials	N/A	N/A	1	29
ENGR 61A	Introduction to Semiconductor Technology	N/A	N/A	2	16
ENGR 61B	Vacuum Systems	N/A	N/A	N/A	N/A
MATH 1A	Calculus	22	750	25	925
MATH 1B	Calculus	16	631	21	749
MATH 1C	Calculus	19	622	20	687
MATH 2A	Differential Equations	6	179	7	208
PHYS 4A	General Physics (Calculus)	14	375	16	449
PHYS 4B	General Physics (Calculus)	10	237	12	322
PHYS 4C	General Physics (Calculus)	5	120	7	176

Place of Program in Curriculum/Similar Programs

This degree program will complement Foothill's existing Engineering AS degree and build on the certificates of achievement that focus on Semiconductor Processing. This degree can be the next step for students looking to advance in the workplace. This program can also be a foundational experience for students looking to transfer into more advanced engineering programs focusing on materials science and computer and electrical engineering.

Similar Programs at Other Colleges in Service Area

This is the first program of its kind in the Bay Area region.

Additional Information Required for State Submission

TOP Code: *0945.00 - Industrial Systems Technology and Maintenance

CIP Code: 47.0303 - Industrial Mechanics and Maintenance Technology/Technician

Will any new resources be required (e.g., facilities, equipment, personnel)? No

Gainful Employment: Yes

Distance Education: 0%

CENTER OF EXCELLENCE
FOR LABOR MARKET RESEARCH

Labor Market Analysis for Program Recommendation Semiconductor Engineering Occupations Foothill College

Prepared by the Bay Region Center of Excellence for Labor Market Research

January 2025

Recommendation

Based on all available data, there appears to be an "undersupply" of Semiconductor Engineering 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 929 students in the Bay Region and 396 students in the Silicon Valley Sub-Region.

Introduction

This report provides student outcomes data on employment and earnings for TOP 0945.00 - Industrial Systems Technology and Maintenance 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 Semiconductor Engineering Occupations in the 12 county Bay Region and in the Silicon Valley Sub-Region for New certificate or degree development (for credit) at Foothill College.

- **Industrial Production Managers (11-3051):** Plan, direct, or coordinate the work activities and resources necessary for manufacturing products in accordance with cost, quality, and quantity specifications.
  Typical Entry-Level Educational: Bachelor's degree
  Typical On-the-Job Training: None
  Percentage of individuals 25+ with an associate degree, certificate, or some post-secondary coursework as their highest level of education attainment: 30%

- **Industrial Engineering Technologists and Technicians (17-3026):** Apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May perform time and motion studies on worker operations in a variety of industries for purposes such as establishing standard production rates or improving efficiency.
  Typical Entry-Level Educational: Associate's degree
  Typical On-the-Job Training: None
  Percentage of individuals 25+ with an associate degree, certificate, or some postsecondary coursework as their highest level of education attainment: 50%

- **Semiconductor Processing Technicians (51-9141):** Perform any or all of the following functions in the manufacture of electronic semiconductors: load semiconductor material into furnace; saw formed ingots into segments; load individual segment into crystal growing chamber and monitor controls; locate crystal axis in ingot using x-ray equipment and saw ingots into wafers; and clean, polish, and load wafers into series of special purpose furnaces, chemical baths, and equipment used to form circuitry and change conductive

properties.

Typical Entry-Level Educational: High school diploma or equivalent

Typical On-the-Job Training: Moderate-term on-the-job training

Percentage of individuals 25+ with an associate degree, certificate, or some postsecondary coursework as their highest level of education attainment: 27%

Occupational Demand

Table 1. Employment Outlook for Semiconductor Engineering Occupations in the Bay Region

Occupation	2023 Jobs	2028 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Wage	Median Hourly Wage
Industrial Production Managers	6,889	7,343	454	7%	2,844	569	$55	$75
Industrial Engineering Technologists and Technicians	1,629	1,838	209	13%	988	198	$30	$36
Semiconductor Processing Technicians	2,223	2,340	117	5%	1,336	267	$22	$23
Total	**10,741**	**11,521**	**780**	**7%**	**5,168**	**1,034**	**$44**	**$58**

Source: Lightcast 2024.3

The 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 Semiconductor Engineering Occupations in the Silicon Valley Sub-Region

Occupation	2023 Jobs	2028 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Wage	Median Hourly Wage
Industrial Production Managers	2,380	2,513	133	6%	952	190	$60	$79
Industrial Engineering Technologists and Technicians	636	730	94	15%	400	80	$32	$37
Semiconductor Processing Technicians	1,786	1,866	80	4%	1,055	211	$22	$23
Total	**4,802**	**5,109**	**307**	**6%**	**2,407**	**481**	**$42**	**$53**

Source: Lightcast 2024.3

Silicon Valley Sub-Region includes: Santa Clara County

Job Postings in the Bay Region and Silicon Valley Sub-Region

Table 3. Number of Job Postings by Occupation for the latest 12 months

Occupation	Bay Region	Silicon Valley
Industrial Production Managers	3,272	866
Industrial Engineering Technologists and Technicians	1,771	436
Semiconductor Processing Technicians	157	87

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Table 4a. Top Job Titles in Job Postings for Semiconductor Engineering Occupations in the Bay Region

Title	Bay	Title	Bay
Manufacturing Technicians	595	Quality Assurance Leads	60
Quality Assurance Managers	199	Directors of Quality	54
Quality Managers	128	Quality Assurance Supervisors	51
Production Technicians	121	Semiconductor Engineers	46
Quality Control Managers	107	Clinical Quality Assurance Managers	40
Manufacturing Managers	105	Quality Control Supervisors	40
Directors of Quality Assurance	85	Directors of Manufacturing	36
Production Managers	76	Manufacturing Associates	33
Process Technicians	69	Bottling Supervisors	31

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Table 4b. Top Job Titles in Job Posting for Semiconductor Engineering Occupations in the Silicon Valley Sub-Region

Title	Silicon Valley	Title	Silicon Valley
Manufacturing Technicians	148	Production Managers	19
Quality Managers	56	Quality Control Managers	19
Manufacturing Managers	46	Directors of Quality	15
Process Technicians	34	Directors of Quality Assurance	15
Quality Assurance Managers	34	Engineering Technicians	15
Quality Assurance Leads	32	Program Managers	15
Semiconductor Engineers	28	Directors of Manufacturing	13
Quality Control Supervisors	21	Manufacturing Operators	13
Production Technicians	20	Manufacturing Equipment Technicians	12

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Industry Concentration

Table 5. Industries Hiring for Semiconductor Engineering Occupations in the Bay Region

Industry - 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2023)	Jobs in Industry (2028)	% Change (2023-28)	% Occupation Group in Industry (2023)
Semiconductor and Related Device Manufacturing	1,952	2,030	4%	18%
Electronic Computer Manufacturing	709	798	12%	7%

Industry - 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2023)	Jobs in Industry (2028)	% Change (2023-28)	% Occupation Group in Industry (2023)
Automobile and Light Duty Motor Vehicle Manufacturing	502	605	20%	5%
Other Electronic Component Manufacturing	364	348	-4%	3%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	345	394	14%	3%
Printed Circuit Assembly (Electronic Assembly) Manufacturing	330	353	7%	3%
Pharmaceutical Preparation Manufacturing	299	255	-15%	3%
Bare Printed Circuit Board Manufacturing	239	199	-17%	2%
Semiconductor Machinery Manufacturing	224	241	8%	2%
Research and Development in Biotechnology (except Nanobiotechnology)	220	265	20%	2%

Source: Lightcast 2024.4

Table 6. Top Employers Posting Semiconductor Engineering Occupations in the Bay Region and the Silicon Valley Sub-Region

Employer	Bay	Employer	Silicon Valley
Aerotek	90	Apple	47
Accenture	69	Amazon	36
Randstad	67	Northrop Grumman	24
Gilead Sciences	57	Accenture	21
Fladger Associates	52	Applied Materials	21
Apple	47	Sanmina	21

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Educational Supply

There are three community colleges in the Bay Region issuing 29 awards on average annually (last 3 years ending 2021-23) on TOP 0945.00 - Industrial Systems Technology and Maintenance. In the Silicon Valley Sub-Region, there is one community college that issued 9 awards on average annually (last 3 years) on this TOP code.

There is a four-year institution in the Bay Region issuing 76 bachelor's degrees on average annually (last 3 years ending 2020-22) on CIP 15.0612- Industrial Technology/Technician There is a four-year institution in the Silicon Valley Sub-Region issuing 76 bachelor's degrees on this CIP code.

Table 7a. Community College Awards on TOP 0945.00 - Industrial Systems Technology and Maintenance in the Bay Region

College	Subregion	Associate Degree	High unit Certificate	Low unit Certificate	Total
Laney	East Bay	0	0	2	2
Los Medanos	East Bay	11	6	1	18
San Jose City	Silicon Valley	4	5	0	9
Total	**-**	**15**	**11**	**3**	**29**

Source: Data Mart

Note: The annual average for awards is 2020-21 to 2022-23.

Table 7b. Bachelor's Degree Awards on CIP 15.0612- Industrial Technology/Technician in the Bay Region

College	Subregion	Bachelor's degree	Total
San Jose State University	Silicon Valley	76	76
Total	**-**	**76**	**76**

Source: Data Mart

Note: The annual average for awards is 2019-20 to 2021-22.

Gap Analysis

Based on the data included in this report, there is a labor market gap in the Bay Region with 1,034 annual openings for the Semiconductor Engineering occupational cluster and 105 annual (3-year average) awards for an annual undersupply of 929 students. In the Silicon Valley Sub-Region, there is also a gap with 481 annual openings and 85 annual (3-year average) awards for an annual undersupply of 396 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0945.00 - Industrial Systems Technology and Maintenance

Metric Outcomes	Bay All CTE Program	Foothill College All CTE Program	State 0945.00	Bay 0945.00	Silicon Valley 0945.00	Foothill College0945.00
Students with a Job Closely Related to Their Field of Study	74%	88%	74%	79%	71%	NA
Median Annual Earnings for SWP Exiting Students	$53,090	$73,174	$49,735	$61,436	$71,804	NA
Median Change in Earnings for SWP Exiting Students	24%	42%	35%	43%	34%	NA
Exiting Students Who Attained the Living Wage	54%	66%	66%	61%	72%	NA

Source: Launchboard Strong Workforce Program Median of 2018 to 2021.

Skills, Certifications and Education

Table 9. Top Skills in Job Postings for Semiconductor Engineering Occupations in the Bay Region

Skill	Posting	Skill	Posting
Continuous Improvement Process	1,100	Corrective And Preventive Action (CAPA)	507
Good Manufacturing Practices	999	Pharmaceuticals	494
Auditing	997	Manufacturing Operations	430
Quality Management	881	Biotechnology	428
Quality Management Systems	789	Product Quality (QA/QC)	380
Project Management	760	Key Performance Indicators (KPIs)	379
Manufacturing Processes	624	Lean Manufacturing	367
Process Improvement	577	Automation	355
Supply Chain	551	Workflow Management	337
New Product Development	511	Risk Management	332

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Table 10. Certifications in Job Postings for Semiconductor Engineering Occupations in the Bay Region

Certification	Posting	Certification	Posting
Automotive Service Excellence (ASE) Certification	49	Six Sigma Certification	37
American Society for Quality (ASQ) Certified	48	Hazard Analysis and Critical Control Point (HACCP) Certification	30
Project Management Professional Certification	40	Forklift Certification	29

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Table 11. Education Requirements for Semiconductor Engineering Occupations in the Bay Region

Education Level	Job Postings	% of Total
High school or GED	981	19%
Associate degree	535	10%
Bachelor's degree & higher	3,758	71%

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Note: 30% of records have been excluded because they do not include a degree level. As a result, the chart above may not be representative of the full sample.

Methodology

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

Sources

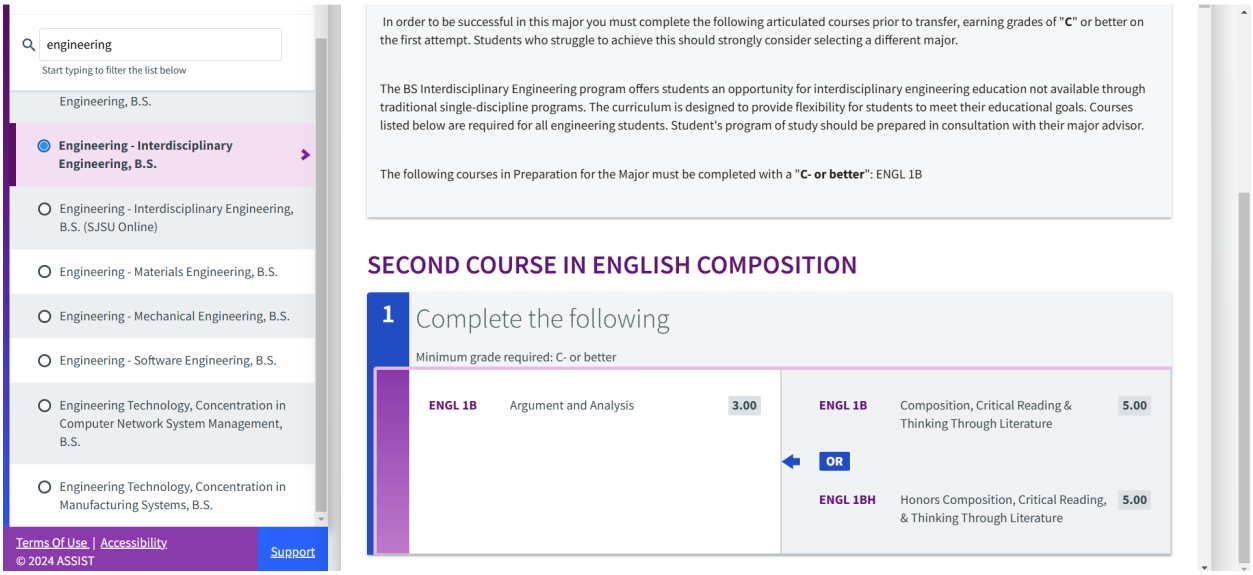
O*Net Online
Lightcast
CTE LaunchBoard www.calpassplus.org
Statewide CTE Outcomes Survey
Employment Development Department Unemployment Insurance Dataset
CCCCO Data Mart

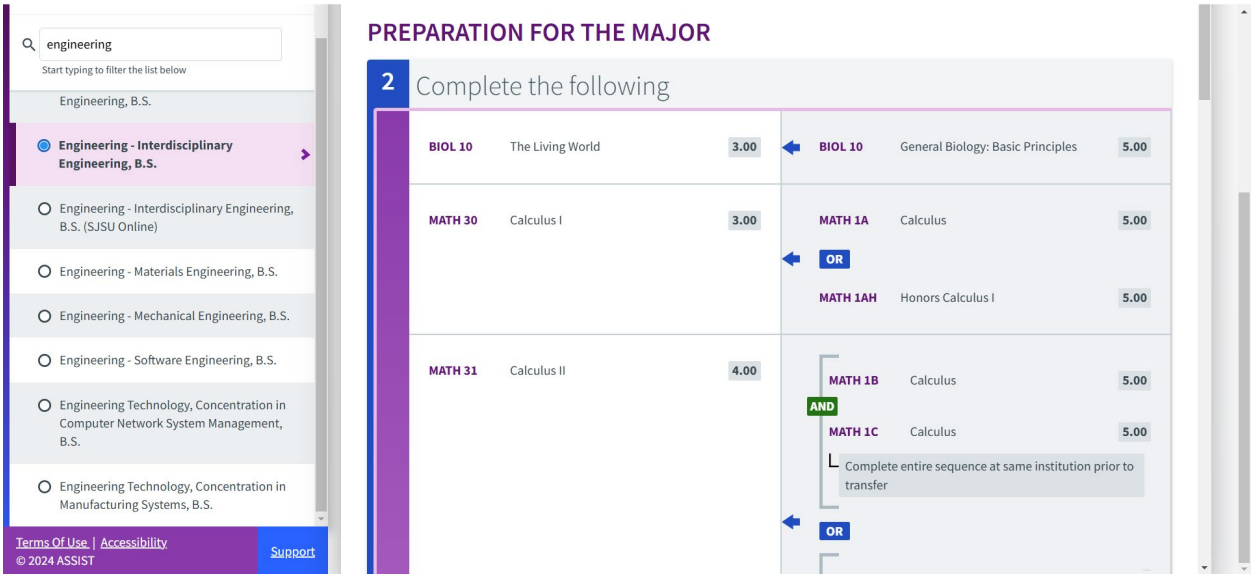
Contacts

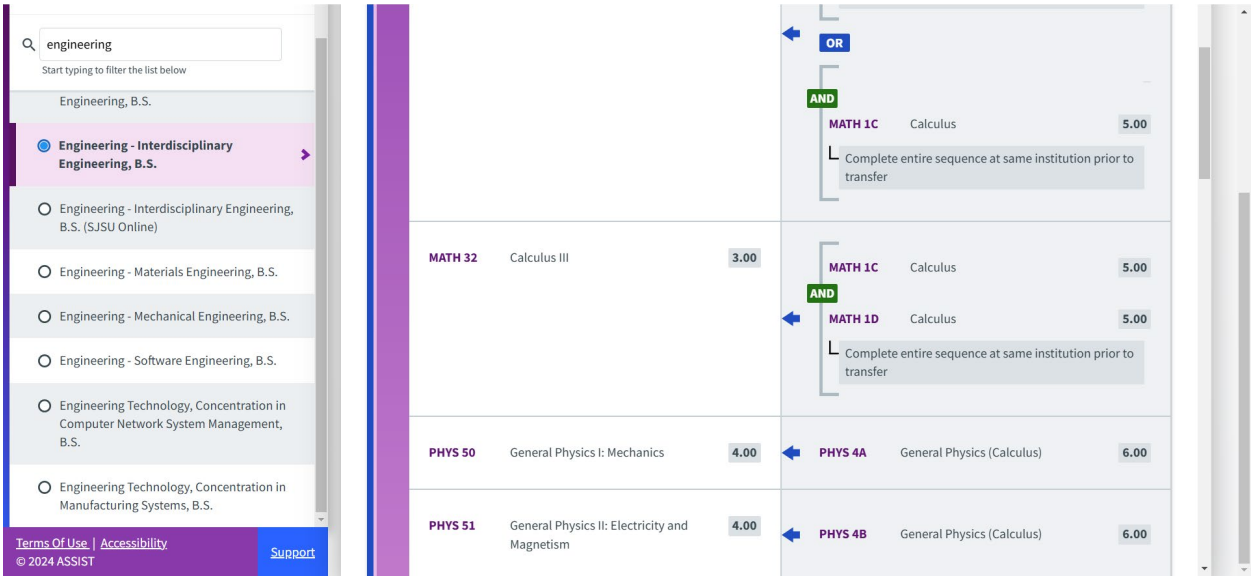
For more information, please contact:

- Yumi Huang, Research Analyst, Bay Region Center of Excellence, yuhuang@cabrillo.edu or (831) 275-0043
- Marcela Reyes, Director, Research and Center of Excellence, mareyes@cabrillo.edu or (831) 219-8875

Students using the Semiconductor Engineering AS degree as preparation before transferring into the likely destination of San Jose State University's Engineering – Interdisciplinary Engineering B. S. will be well prepared for the program. Of the 15 courses required for Foothill's Semiconductor Engineering A. S. eleven of those courses (73%) are articulated and a part of the Interdisciplinary Engineering BS at SJSU. Screenshots from assist.org follows.






engineering
Start typing to filter the list below
Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S. (SJSU Online)
Engineering - Materials Engineering, B.S.
Engineering - Mechanical Engineering, B.S.
Engineering - Software Engineering, B.S.
Engineering Technology, Concentration in Computer Network System Management, B.S.
Engineering Technology, Concentration in Manufacturing Systems, B.S.
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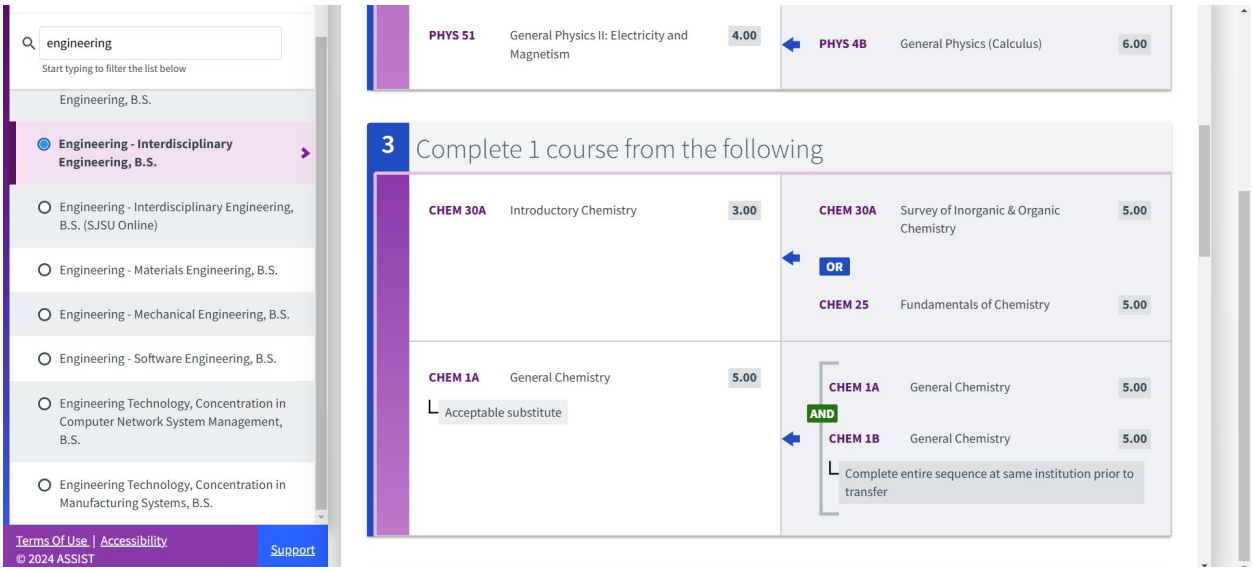
Support
OR
AND
MATH 1C Calculus 5.00
Complete entire sequence at same institution prior to transfer
MATH 32 Calculus III 3.00
MATH 1C Calculus 5.00
AND
MATH 1D Calculus 5.00
Complete entire sequence at same institution prior to transfer
PHYS 50 General Physics I: Mechanics 4.00
PHYS 4A General Physics (Calculus) 6.00
PHYS 51 General Physics II: Electricity and Magnetism 4.00
PHYS 4B General Physics (Calculus) 6.00


engineering
Start typing to filter the list below
Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S. (SJSU Online)
Engineering - Materials Engineering, B.S.
Engineering - Mechanical Engineering, B.S.
Engineering - Software Engineering, B.S.
Engineering Technology, Concentration in Computer Network System Management, B.S.
Engineering Technology, Concentration in Manufacturing Systems, B.S.
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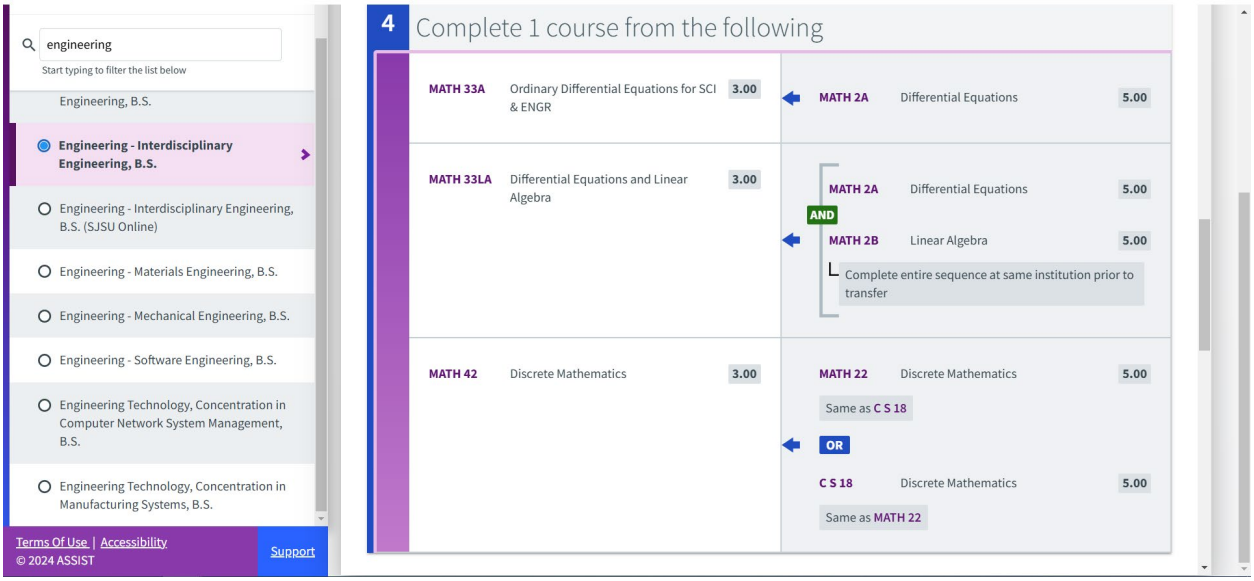
Support
PHYS 51 General Physics II: Electricity and Magnetism 4.00
PHYS 4B General Physics (Calculus) 6.00
3 Complete 1 course from the following
CHEM 30A Introductory Chemistry 3.00
CHEM 30A Survey of Inorganic & Organic Chemistry 5.00
OR
CHEM 25 Fundamentals of Chemistry 5.00
CHEM 1A General Chemistry 5.00
Acceptable substitute
CHEM 1A General Chemistry 5.00
AND
CHEM 1B General Chemistry 5.00
Complete entire sequence at same institution prior to transfer


engineering
Start typing to filter the list below
Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S. (SJSU Online)
Engineering - Materials Engineering, B.S.
Engineering - Mechanical Engineering, B.S.
Engineering - Software Engineering, B.S.
Engineering Technology, Concentration in Computer Network System Management, B.S.
Engineering Technology, Concentration in Manufacturing Systems, B.S.
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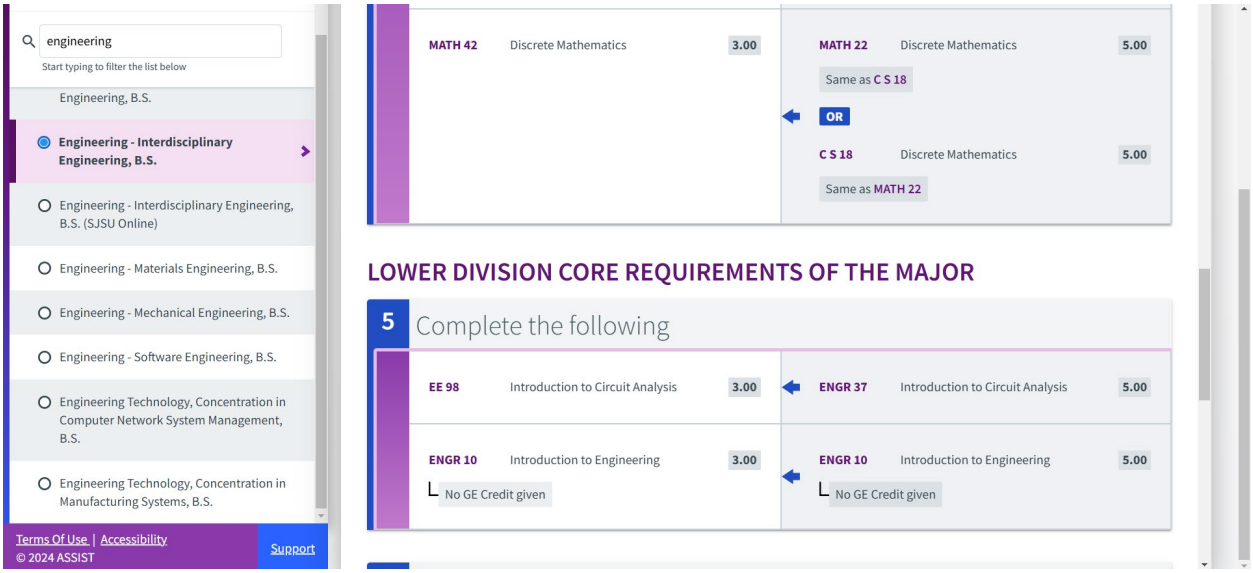
Support
4 Complete 1 course from the following
MATH 33A Ordinary Differential Equations for SCI & ENGR 3.00
MATH 2A Differential Equations 5.00
MATH 33LA Differential Equations and Linear Algebra 3.00
MATH 2A Differential Equations 5.00
AND
MATH 2B Linear Algebra 5.00
Complete entire sequence at same institution prior to transfer
MATH 42 Discrete Mathematics 3.00
MATH 22 Discrete Mathematics 5.00
Same as C S 18
OR
C S 18 Discrete Mathematics 5.00
Same as MATH 22


engineering
Start typing to filter the list below
Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S. (SJSU Online)
Engineering - Materials Engineering, B.S.
Engineering - Mechanical Engineering, B.S.
Engineering - Software Engineering, B.S.
Engineering Technology, Concentration in Computer Network System Management, B.S.
Engineering Technology, Concentration in Manufacturing Systems, B.S.
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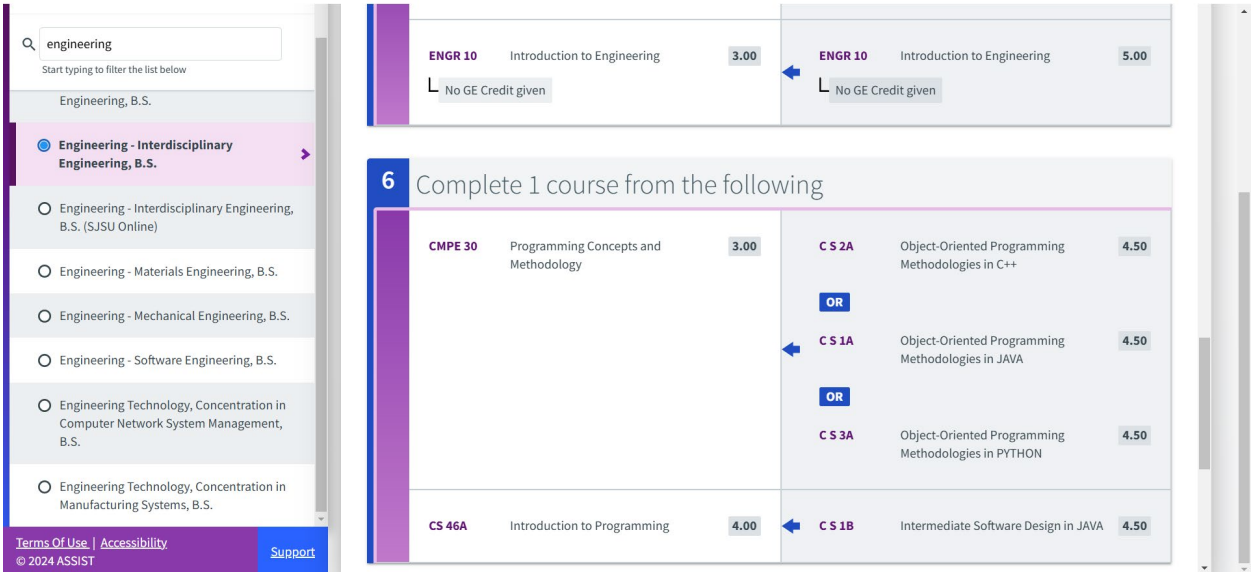
Support
MATH 42 Discrete Mathematics 3.00
MATH 22 Discrete Mathematics 5.00
Same as C S 18
OR
C S 18 Discrete Mathematics 5.00
Same as MATH 22
LOWER DIVISION CORE REQUIREMENTS OF THE MAJOR
5 Complete the following
EE 98 Introduction to Circuit Analysis 3.00
ENGR 37 Introduction to Circuit Analysis 5.00
ENGR 10 Introduction to Engineering 3.00
No GE Credit given
ENGR 10 Introduction to Engineering 5.00
No GE Credit given


engineering
Start typing to filter the list below
Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S. (SJSU Online)
Engineering - Materials Engineering, B.S.
Engineering - Mechanical Engineering, B.S.
Engineering - Software Engineering, B.S.
Engineering Technology, Concentration in Computer Network System Management, B.S.
Engineering Technology, Concentration in Manufacturing Systems, B.S.
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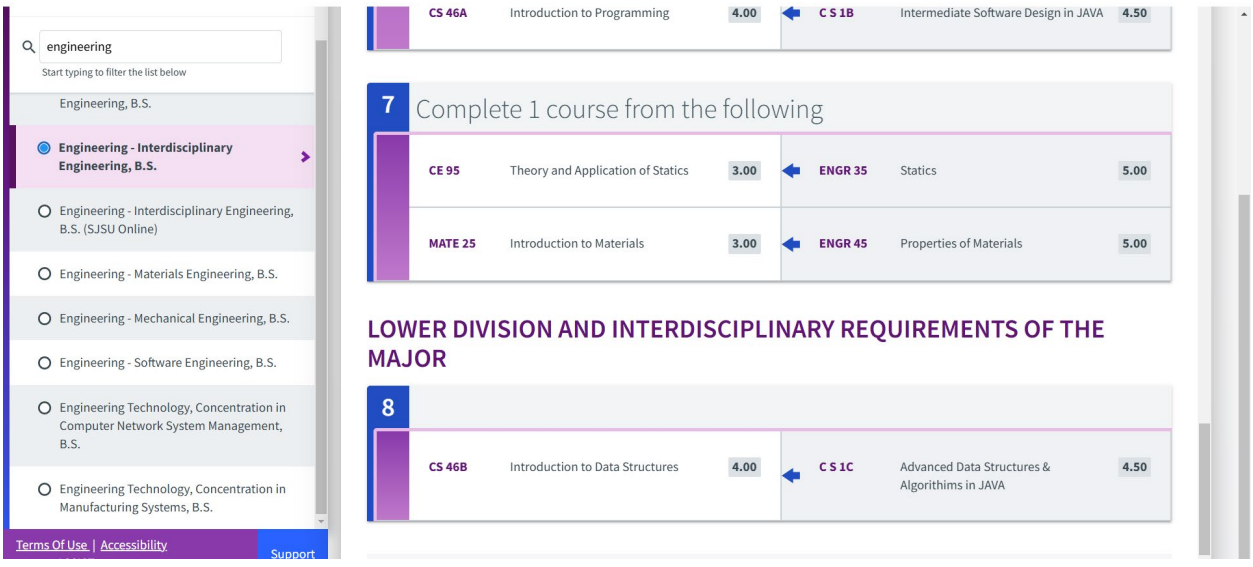
Support
ENGR 10 Introduction to Engineering 3.00
No GE Credit given
ENGR 10 Introduction to Engineering 5.00
No GE Credit given
6 Complete 1 course from the following
CMPE 30 Programming Concepts and Methodology 3.00
C S 2A Object-Oriented Programming Methodologies in C++ 4.50
OR
C S 1A Object-Oriented Programming Methodologies in JAVA 4.50
OR
C S 3A Object-Oriented Programming Methodologies in PYTHON 4.50
CS 46A Introduction to Programming 4.00
C S 1B Intermediate Software Design in JAVA 4.50


engineering
Start typing to filter the list below
Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S.
Engineering - Interdisciplinary Engineering, B.S. (SJSU Online)
Engineering - Materials Engineering, B.S.
Engineering - Mechanical Engineering, B.S.
Engineering - Software Engineering, B.S.
Engineering Technology, Concentration in Computer Network System Management, B.S.
Engineering Technology, Concentration in Manufacturing Systems, B.S.
Terms Of Use | Accessibility
Support
CS 46A Introduction to Programming 4.00
C S 1B Intermediate Software Design in JAVA 4.50
7 Complete 1 course from the following
CE 95 Theory and Application of Statics 3.00
ENGR 35 Statics 5.00
MATE 25 Introduction to Materials 3.00
ENGR 45 Properties of Materials 5.00
LOWER DIVISION AND INTERDISCIPLINARY REQUIREMENTS OF THE MAJOR
8
CS 46B Introduction to Data Structures 4.00
C S 1C Advanced Data Structures & Algorithims in JAVA 4.50

Vacuum Technology, Certificate of Achievement

Basic Information

Faculty Author(s)

Sarah Parikh

Department
Engineering

Division
Science Technology Engineering and Mathematics

Title of Degree/Certificate
Vacuum Technology

Type of Award
Certificate of Achievement

Workforce/CTE Program:
Yes

Effective Catalog Edition:
2025-2026

Certificate of Achievement Workforce Narrative

Program Goals and Objectives
The Certificate of Achievement in Vacuum Technology will prepare students for industry careers involving vacuum technology. It can be used as a bridge to Foothill College's Semiconductor Process Engineering Associate Degree and also used to gain knowledge and skills to advance in the workplace. The certificate is closely aligned with industry needs backed on feedback from employers.

Program Learning Outcomes

- Students will be prepared for career advancement working with vacuum technology.
- Students will be able to apply engineering thinking principles to workplace applications involving vacuum technology.

Catalog Description
The Certificate of Achievement Vacuum Technology is for any student looking to gain foundational knowledge about how vacuum works and how it is used in industry. The certificate is relevant for students looking to enter the workforce, looking to learn new skills while working, or looking to prepare for the Associate in Science Degree in Semiconductor

Process Engineering. The courses provide an understanding of vacuum principles and troubleshooting.

Program Requirements

Core Course Units: 15

Code	Title	Units
CHEM F025.	FUNDAMENTALS OF CHEMISTRY	5
ENGR F010.	INTRODUCTION TO ENGINEERING	5
ENGR F061B	VACUUM SYSTEMS	5

Total Units: 15

Proposed Sequence

Term	Units
Year 1, Fall	5
Year 1, Winter	5
Year 1, Spring	5

Master Planning

The Certificate of Achievement in Vacuum Technology is aligned with Foothill College's mission statement regarding preparing students for the workforce. The certificate also acts as preparation for a local degree which may lead to a transfer pathway at a later date.

Enrollment and Completer Projections

After the program is established, it is expected that we will see 35 students complete the certificate each year. Students may come from Foothill's semiconductor apprenticeship program or from the workforce as employers want their employees to skill up.

Historical Enrollment Data

Course #	Course Title	Y1 - Annual Sections	Y1 - Annual Enrollment	Y2 - Annual Sections	Y2 - Annual Enrollment
CHEM 25	Fundamentals of Chemistry	17	487	17	524
ENGR 10	Introduction to Engineering	2	64	2	69
ENGR 61B	Vacuum Systems	N/A	N/A	N/A	N/A

Place of Program in Curriculum/Similar Programs

This certificate will act as a bridge between the Certificate of Achievement in Semiconductor Processing—which is both a part of the apprenticeship program and accessible to students

interested in joining the semiconductor processing workforce—and the Associate in Science Degree in Semiconductor Process Engineering. This certificate will provide additional early successes for students who might not have felt comfortable jumping directly into an associate degree program.

Similar Programs at Other Colleges in Service Area

There are no other identical programs in the area; however, there are other programs that complement this certificate. This certificate may be of interest to students in Mechatronics programs at Mission College and in other Industrial Manufacturing programs in the area.

Additional Information Required for State Submission

TOP Code: *0945.00 - Industrial Systems Technology and Maintenance

CIP Code: 47.0303 - Industrial Mechanics and Maintenance Technology/Technician

Will any new resources be required (e.g., facilities, equipment, personnel)? No

Gainful Employment: Yes

Distance Education: 0%

CENTER OF EXCELLENCE
FOR LABOR MARKET RESEARCH

Labor Market Analysis for Program Recommendation Semiconductor Engineering Occupations Foothill College

Prepared by the Bay Region Center of Excellence for Labor Market Research

January 2025

Recommendation

Based on all available data, there appears to be an "undersupply" of Semiconductor Engineering 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 929 students in the Bay Region and 396 students in the Silicon Valley Sub-Region.

Introduction

This report provides student outcomes data on employment and earnings for TOP 0945.00 - Industrial Systems Technology and Maintenance 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 Semiconductor Engineering Occupations in the 12 county Bay Region and in the Silicon Valley Sub-Region for New certificate or degree development (for credit) at Foothill College.

- **Industrial Production Managers (11-3051):** Plan, direct, or coordinate the work activities and resources necessary for manufacturing products in accordance with cost, quality, and quantity specifications.
  Typical Entry-Level Educational: Bachelor's degree
  Typical On-the-Job Training: None
  Percentage of individuals 25+ with an associate degree, certificate, or some post-secondary coursework as their highest level of education attainment: 30%

- **Industrial Engineering Technologists and Technicians (17-3026):** Apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May perform time and motion studies on worker operations in a variety of industries for purposes such as establishing standard production rates or improving efficiency.
  Typical Entry-Level Educational: Associate's degree
  Typical On-the-Job Training: None
  Percentage of individuals 25+ with an associate degree, certificate, or some postsecondary coursework as their highest level of education attainment: 50%

- **Semiconductor Processing Technicians (51-9141):** Perform any or all of the following functions in the manufacture of electronic semiconductors: load semiconductor material into furnace; saw formed ingots into segments; load individual segment into crystal growing chamber and monitor controls; locate crystal axis in ingot using x-ray equipment and saw ingots into wafers; and clean, polish, and load wafers into series of special purpose furnaces, chemical baths, and equipment used to form circuitry and change conductive

properties.

Typical Entry-Level Educational: High school diploma or equivalent

Typical On-the-Job Training: Moderate-term on-the-job training

Percentage of individuals 25+ with an associate degree, certificate, or some postsecondary coursework as their highest level of education attainment: 27%

Occupational Demand

Table 1. Employment Outlook for Semiconductor Engineering Occupations in the Bay Region

Occupation	2023 Jobs	2028 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Wage	Median Hourly Wage
Industrial Production Managers	6,889	7,343	454	7%	2,844	569	$55	$75
Industrial Engineering Technologists and Technicians	1,629	1,838	209	13%	988	198	$30	$36
Semiconductor Processing Technicians	2,223	2,340	117	5%	1,336	267	$22	$23
Total	**10,741**	**11,521**	**780**	**7%**	**5,168**	**1,034**	**$44**	**$58**

Source: Lightcast 2024.3

The 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 Semiconductor Engineering Occupations in the Silicon Valley Sub-Region

Occupation	2023 Jobs	2028 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Wage	Median Hourly Wage
Industrial Production Managers	2,380	2,513	133	6%	952	190	$60	$79
Industrial Engineering Technologists and Technicians	636	730	94	15%	400	80	$32	$37
Semiconductor Processing Technicians	1,786	1,866	80	4%	1,055	211	$22	$23
Total	**4,802**	**5,109**	**307**	**6%**	**2,407**	**481**	**$42**	**$53**

Source: Lightcast 2024.3

Silicon Valley Sub-Region includes: Santa Clara County

Job Postings in the Bay Region and Silicon Valley Sub-Region

Table 3. Number of Job Postings by Occupation for the latest 12 months

Occupation	Bay Region	Silicon Valley
Industrial Production Managers	3,272	866
Industrial Engineering Technologists and Technicians	1,771	436
Semiconductor Processing Technicians	157	87

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Table 4a. Top Job Titles in Job Postings for Semiconductor Engineering Occupations in the Bay Region

Title	Bay	Title	Bay
Manufacturing Technicians	595	Quality Assurance Leads	60
Quality Assurance Managers	199	Directors of Quality	54
Quality Managers	128	Quality Assurance Supervisors	51
Production Technicians	121	Semiconductor Engineers	46
Quality Control Managers	107	Clinical Quality Assurance Managers	40
Manufacturing Managers	105	Quality Control Supervisors	40
Directors of Quality Assurance	85	Directors of Manufacturing	36
Production Managers	76	Manufacturing Associates	33
Process Technicians	69	Bottling Supervisors	31

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Table 4b. Top Job Titles in Job Posting for Semiconductor Engineering Occupations in the Silicon Valley Sub-Region

Title	Silicon Valley	Title	Silicon Valley
Manufacturing Technicians	148	Production Managers	19
Quality Managers	56	Quality Control Managers	19
Manufacturing Managers	46	Directors of Quality	15
Process Technicians	34	Directors of Quality Assurance	15
Quality Assurance Managers	34	Engineering Technicians	15
Quality Assurance Leads	32	Program Managers	15
Semiconductor Engineers	28	Directors of Manufacturing	13
Quality Control Supervisors	21	Manufacturing Operators	13
Production Technicians	20	Manufacturing Equipment Technicians	12

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Industry Concentration

Table 5. Industries Hiring for Semiconductor Engineering Occupations in the Bay Region

Industry - 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2023)	Jobs in Industry (2028)	% Change (2023-28)	% Occupation Group in Industry (2023)
Semiconductor and Related Device Manufacturing	1,952	2,030	4%	18%
Electronic Computer Manufacturing	709	798	12%	7%

Industry - 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2023)	Jobs in Industry (2028)	% Change (2023-28)	% Occupation Group in Industry (2023)
Automobile and Light Duty Motor Vehicle Manufacturing	502	605	20%	5%
Other Electronic Component Manufacturing	364	348	-4%	3%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	345	394	14%	3%
Printed Circuit Assembly (Electronic Assembly) Manufacturing	330	353	7%	3%
Pharmaceutical Preparation Manufacturing	299	255	-15%	3%
Bare Printed Circuit Board Manufacturing	239	199	-17%	2%
Semiconductor Machinery Manufacturing	224	241	8%	2%
Research and Development in Biotechnology (except Nanobiotechnology)	220	265	20%	2%

Source: Lightcast 2024.4

Table 6. Top Employers Posting Semiconductor Engineering Occupations in the Bay Region and the Silicon Valley Sub-Region

Employer	Bay	Employer	Silicon Valley
Aerotek	90	Apple	47
Accenture	69	Amazon	36
Randstad	67	Northrop Grumman	24
Gilead Sciences	57	Accenture	21
Fladger Associates	52	Applied Materials	21
Apple	47	Sanmina	21

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Educational Supply

There are three community colleges in the Bay Region issuing 29 awards on average annually (last 3 years ending 2021-23) on TOP 0945.00 - Industrial Systems Technology and Maintenance. In the Silicon Valley Sub-Region, there is one community college that issued 9 awards on average annually (last 3 years) on this TOP code.

There is a four-year institution in the Bay Region issuing 76 bachelor's degrees on average annually (last 3 years ending 2020-22) on CIP 15.0612- Industrial Technology/Technician There is a four-year institution in the Silicon Valley Sub-Region issuing 76 bachelor's degrees on this CIP code.

Table 7a. Community College Awards on TOP 0945.00 - Industrial Systems Technology and Maintenance in the Bay Region

College	Subregion	Associate Degree	High unit Certificate	Low unit Certificate	Total
Laney	East Bay	0	0	2	2
Los Medanos	East Bay	11	6	1	18
San Jose City	Silicon Valley	4	5	0	9
Total	**-**	**15**	**11**	**3**	**29**

Source: Data Mart

Note: The annual average for awards is 2020-21 to 2022-23.

Table 7b. Bachelor's Degree Awards on CIP 15.0612- Industrial Technology/Technician in the Bay Region

College	Subregion	Bachelor's degree	Total
San Jose State University	Silicon Valley	76	76
Total	**-**	**76**	**76**

Source: Data Mart

Note: The annual average for awards is 2019-20 to 2021-22.

Gap Analysis

Based on the data included in this report, there is a labor market gap in the Bay Region with 1,034 annual openings for the Semiconductor Engineering occupational cluster and 105 annual (3-year average) awards for an annual undersupply of 929 students. In the Silicon Valley Sub-Region, there is also a gap with 481 annual openings and 85 annual (3-year average) awards for an annual undersupply of 396 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0945.00 - Industrial Systems Technology and Maintenance

Metric Outcomes	Bay All CTE Program	Foothill College All CTE Program	State 0945.00	Bay 0945.00	Silicon Valley 0945.00	Foothill College0945.00
Students with a Job Closely Related to Their Field of Study	74%	88%	74%	79%	71%	NA
Median Annual Earnings for SWP Exiting Students	$53,090	$73,174	$49,735	$61,436	$71,804	NA
Median Change in Earnings for SWP Exiting Students	24%	42%	35%	43%	34%	NA
Exiting Students Who Attained the Living Wage	54%	66%	66%	61%	72%	NA

Source: Launchboard Strong Workforce Program Median of 2018 to 2021.

Skills, Certifications and Education

Table 9. Top Skills in Job Postings for Semiconductor Engineering Occupations in the Bay Region

Skill	Posting	Skill	Posting
Continuous Improvement Process	1,100	Corrective And Preventive Action (CAPA)	507
Good Manufacturing Practices	999	Pharmaceuticals	494
Auditing	997	Manufacturing Operations	430
Quality Management	881	Biotechnology	428
Quality Management Systems	789	Product Quality (QA/QC)	380
Project Management	760	Key Performance Indicators (KPIs)	379
Manufacturing Processes	624	Lean Manufacturing	367
Process Improvement	577	Automation	355
Supply Chain	551	Workflow Management	337
New Product Development	511	Risk Management	332

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Table 10. Certifications in Job Postings for Semiconductor Engineering Occupations in the Bay Region

Certification	Posting	Certification	Posting
Automotive Service Excellence (ASE) Certification	49	Six Sigma Certification	37
American Society for Quality (ASQ) Certified	48	Hazard Analysis and Critical Control Point (HACCP) Certification	30
Project Management Professional Certification	40	Forklift Certification	29

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Table 11. Education Requirements for Semiconductor Engineering Occupations in the Bay Region

Education Level	Job Postings	% of Total
High school or GED	981	19%
Associate degree	535	10%
Bachelor's degree & higher	3,758	71%

Source: Lightcast 2024.4; "Job Posting Analytics." Jan. 2024 - Dec. 2024

Note: 30% of records have been excluded because they do not include a degree level. As a result, the chart above may not be representative of the full sample.

Methodology

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

Sources

O*Net Online
Lightcast
CTE LaunchBoard www.calpassplus.org
Statewide CTE Outcomes Survey
Employment Development Department Unemployment Insurance Dataset
CCCCO Data Mart

Contacts

For more information, please contact:

- Yumi Huang, Research Analyst, Bay Region Center of Excellence, yuhuang@cabrillo.edu or (831) 275-0043
- Marcela Reyes, Director, Research and Center of Excellence, mareyes@cabrillo.edu or (831) 219-8875

Principles of Machine Learning and Artificial Intelligence, Certificate of Achievement

Basic Information

Faculty Author(s)

Eric Reed

Department
Computer Science

Division
Science Technology Engineering and Mathematics

Title of Degree/Certificate
Principles of Machine Learning and Artificial Intelligence

Type of Award
Certificate of Achievement

Workforce/CTE Program:
Yes

Effective Catalog Edition:
2025-2026

Certificate of Achievement Workforce Narrative

Program Goals and Objectives
The Certificate of Achievement in Principles of Machine Learning and Artificial Intelligence will provide a foundational education in the algorithms and applications of AI. The certificate will offer an introductory level of programming and data science curricula, as well as a course in ethics specific to this field, with minimal prerequisites so as to be attainable within one academic year. In addition, this certificate would be intended to serve as a pathway for students who wish to pursue more advanced programs planned for Foothill College in the future.

Program Learning Outcomes

- Students will be able to use Jupyter notebooks or similar programs to load and preprocess data, train and validate models, and visualize results.
- Students will be able to write programs that traverse complex discrete state spaces to reach a goal or optimize an outcome.

- Students will be able to design adversarial agents that approximate optimal behavior with incomplete environmental information.
- Students will be able to explain the causes of biased outcomes in poorly designed models, as well as how to overcome them.

Catalog Description

The Certificate of Achievement in Principles of Machine Learning and Artificial Intelligence provides foundational knowledge in this growing field. This certificate is relevant for students looking to enter the workforce, learn new skills in an existing role, or work toward other certificates and degrees in computer science, artificial intelligence, and machine learning.

Program Requirements

Core Course Units: 22

Code	Title	Units
C S F003A	OBJECT-ORIENTED PROGRAMMING METHODOLOGIES IN PYTHON	4.5
C S F008A	INTRODUCTION TO DATA SCIENCE	4.5
C S F011A	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	4.5
C S F012A	INTRODUCTION TO MACHINE LEARNING	4.5
HUMN F015.	ETHICS IN ARTIFICIAL INTELLIGENCE	4
or PHIL F015.	ETHICS IN ARTIFICIAL INTELLIGENCE	

Total Units: 22

Proposed Sequence

Term	Units
Year 1, Fall	8.5
Year 1, Winter	9
Year 1, Spring	4.5

Master Planning

The Certificate of Achievement in Principles of Machine Learning and Artificial Intelligence is aligned with Foothill College's mission statement regarding preparing students for the workforce in addition to critical thinking skills and technical knowledge to be a productive member of a democratic society. The certificate will also prepare students for a local degree, which is also aligned with Foothill College's goals.

Enrollment and Completer Projections

The initial year is expected to have 30 students complete this certificate. The courses to be introduced in Fall 2025 that comprise the core subject matter for this certificate—C S 11A

and C S 12A—are expected to be highly in-demand and reach an enrollment of 40 students per section, with one section of both courses anticipated to be available for the Fall, Winter, and Spring terms of the 2025-2026 school year. The future addition of more advanced certificates and degrees in Artificial Intelligence and Machine Learning are expected to result in higher rates of completion for this certificate compared to its initial year offering.

Historical information is from 2022-23 and 2023-24. We are now offering C S 8A, which has had strong enrollment in its initial two quarters, two sections online in Winter 2025 with 71 students total, one section in person in Spring 2025 with 26 students total.

Historical Enrollment Data

Course #	Course Title	Y1 - Annual Sections	Y1 - Annual Enrollment	Y2 - Annual Sections	Y2 - Annual Enrollment
C S 3A	OBJECT-ORIENTED PROGRAMMING METHODOLOGIES IN PYTHON	19	696	17	660
C S 8A	INTRODUCTION TO DATA SCIENCE	N/A	N/A	N/A	N/A
C S 11A	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	N/A	N/A	N/A	N/A
C S 12A	INTRODUCTION TO MACHINE LEARNING	N/A	N/A	N/A	N/A
HUMN 15	ETHICS IN ARTIFICIAL INTELLIGENCE	N/A	N/A	N/A	N/A
PHIL 15	ETHICS IN ARTIFICIAL INTELLIGENCE	N/A	N/A	N/A	N/A

Place of Program in Curriculum/Similar Programs

This certificate is new. It may serve as a standalone certificate for workforce training or as a pathway to the planned advanced AI/ML certificate(s) and/or Artificial Intelligence AS degree. There is not currently a program like this at Foothill College.

Similar Programs at Other Colleges in Service Area

De Anza College presently has a proposal for a Certificate of Achievement in Applied Artificial Intelligence through their Computer Science and Information Systems department.

Additional Information Required for State Submission

TOP Code: *0707.00 - Computer Software Development

CIP Code: 11.0201 - Computer Programming/Programmer, General

Will any new resources be required (e.g., facilities, equipment, personnel)? No

Gainful Employment: Yes

Distance Education: 100%

CENTER OF EXCELLENCE
FOR LABOR MARKET RESEARCH

Labor Market Analysis for Program Recommendation Artificial Intelligence for Business Occupations Foothill College

Prepared by the Bay Region Center of Excellence for Labor Market Research

November 2024

Recommendation

Based on all available data, there appears to be an "undersupply" of Artificial Intelligence for Business 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 13,575 students in the Bay Region and 4,511 students in the Silicon Valley Sub-Region.

Introduction

This report provides student outcomes data on employment and earnings for TOP 0707.00 - Computer Software Development 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 Artificial Intelligence for BusinessOccupations in the 12 county Bay Region and in the Silicon Valley Sub-Region for New certificate or degree development (for credit) at Foothill College.

- **Marketing Managers (11-2021):** Plan, direct, or coordinate marketing policies and programs, such as determining the demand for products and services offered by a firm and its competitors, and identify potential customers. Develop pricing strategies with the goal of maximizing the firm's profits or share of the market while ensuring the firm's customers are satisfied. Oversee product development or monitor trends that indicate the need for new products and services.
  Entry-Level Educational Requirement: Bachelor's degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 13%

- **Sales Managers (11-2022):** Plan, direct, or coordinate the actual distribution or movement of a product or service to the customer. Coordinate sales distribution by establishing sales territories, quotas, and goals and establish training programs for sales representatives. Analyze sales statistics gathered by staff to determine sales potential and inventory requirements and monitor the preferences of customers.
  Entry-Level Educational Requirement: Bachelor's degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 28%

- **Market Research Analysts and Marketing Specialists (13-1161):** Research conditions in local, regional, national, or online markets. Gather information to determine potential sales of a product or service, or plan a marketing or advertising campaign. May gather information on competitors, prices, sales, and methods of marketing and distribution. May employ search marketing tactics, analyze web metrics, and develop recommendations to increase search engine ranking and visibility to target markets.

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Percentage of Community College Award Holders or Some Postsecondary Coursework: 15%

- **Computer Occupations, All Other (15-1299):** All computer occupations not listed separately.
  Entry-Level Educational Requirement: Bachelor's degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 35%

- **Data Scientists (15-2051):** Develop and implement a set of techniques or analytics applications to transform raw data into meaningful information using data-oriented programming languages and visualization software. Apply data mining, data modeling, natural language processing, and machine learning to extract and analyze information from large structured and unstructured datasets. Visualize, interpret, and report data findings. May create dynamic data reports.
  Entry-Level Educational Requirement: Bachelor's degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 10%

Occupational Demand

Table 1. Employment Outlook for Artificial Intelligence for BusinessOccupations in the Bay Region

Occupation	2023 Jobs	2028 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Marketing Managers	23,858	24,830	971	4%	10,520	2,104	$74	$99
Sales Managers	34,110	34,970	860	3%	13,502	2,700	$52	$82
Market Research Analysts and Marketing Specialists	40,047	43,466	3,419	9%	22,153	4,431	$36	$56
Computer Occupations, All Other	40,872	43,182	2,309	6%	15,348	3,070	$47	$70
Data Scientists	13,963	16,433	2,470	18%	6,914	1,383	$60	$79
Total	**152,850**	**162,881**	**10,031**	**7%**	**68,437**	**13,688**	**$51**	**$74**

Source: Lightcast 2024.3

The 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 Artificial Intelligence for BusinessOccupations in the Silicon Valley Sub-Region

Occupation	2023 Jobs	2028 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Marketing Managers	7,799	8,087	288	4%	3,386	677	$81	$103
Sales Managers	10,591	10,864	272	3%	4,138	828	$67	$100
Market Research Analysts and Marketing Specialists	11,632	12,495	863	7%	6,278	1,256	$39	$63
Computer Occupations, All Other	18,032	18,927	895	5%	6,619	1,324	$60	$81
Data Scientists	4,889	5,650	761	16%	2,303	461	$68	$82
Total	**52,943**	**56,023**	**3,080**	**6%**	**22,724**	**4,546**	**$61**	**$84**

Source: Lightcast 2024.3

Silicon Valley Sub-Region includes: Santa Clara County

Job Postings in the Bay Region and Silicon Valley Sub-Region

Table 3. Number of Job Postings by Occupation for the latest 12 months

Occupation	Bay Region	Silicon Valley
Computer Occupations, All Other	23,209	10,612
Marketing Managers	18,867	7,123
Data Scientists	16,733	7,851
Sales Managers	10,452	2,855
Market Research Analysts and Marketing Specialists	7,342	2,096

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Table 4a. Top Job Titles in Job Postings for Artificial Intelligence for Business Occupations in the Bay Region

Title	Bay	Title	Bay
Machine Learning Engineers	1,978	Marketing Managers	591
Product Managers	1,906	Product Marketing Managers	546
Data Scientists	1,741	Site Reliability Engineers	516
Data Analysts	868	Directors of Product Management	486
Platform Software Engineers	853	Firmware Engineers	485
Sales Managers	780	Systems Engineers	474
Business Development Managers	765	Marketing Product Managers	410
Machine Learning Software Engineers	751	Directors of Business Development	402
Principal Product Managers	695	Territory Sales Managers	327

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Table 4b. Top Job Titles in Job Posting for Artificial Intelligence for Business Occupations in the Silicon Valley Sub-Region

Title	Silicon Valley	Title	Silicon Valley
Machine Learning Engineers	1,193	Google Cloud Architects	255
Product Managers	846	Business Development Managers	244
Data Scientists	754	Directors of Product Management	234
Machine Learning Software Engineers	524	Systems Engineers	218
Platform Software Engineers	398	Sales Managers	216
Firmware Engineers	394	Product Marketing Managers	184
Data Analysts	343	Marketing Managers	169
Site Reliability Engineers	330	Technical Product Managers	165

Title	Silicon Valley	Title	Silicon Valley
Principal Product Managers	317	Deep Learning Engineers	159

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Industry Concentration

Table 5. Industries Hiring for Artificial Intelligence for Business Occupations in the Bay Region

Industry - 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2023)	Jobs in Industry (2028)	% Change (2023-28)	% Occupation Group in Industry (2023)
Custom Computer Programming Services	15,140	17,419	15%	10%
Software Publishers	9,483	10,534	11%	6%
Electronic Computer Manufacturing	8,309	9,144	10%	5%
Corporate, Subsidiary, and Regional Managing Offices	6,834	6,328	-7%	4%
Computer Systems Design Services	6,648	6,507	-2%	4%
Data Processing, Hosting, and Related Services	6,598	7,947	20%	4%
Web Search Portals and All Other Information Services	5,885	6,115	4%	4%
Media Streaming Distribution Services, Social Networks, and Other Media Networks and Content Providers	4,708	5,016	7%	3%
Administrative Management and General Management Consulting Services	4,261	4,901	15%	3%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	3,487	3,923	13%	2%

Source: Lightcast 2024.4

Table 6. Top Employers Posting Artificial Intelligence for Business Occupations in the Bay Region and the Silicon Valley Sub-Region

Employer	Bay	Employer	Silicon Valley
Google	2,075	Apple	2,015
Apple	2,058	Google	1,753
Meta	1,546	Tiktok	1,126
Amazon	1,338	Nvidia	866
Tiktok	1,172	Amazon	773
Nvidia	866	Palo Alto Networks	441

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Educational Supply

There are four community colleges in the Bay Region issuing 64 awards on average annually (last 3 years ending 2021-23) on TOP 0707.00 - Computer Software Development. In the Silicon Valley Sub-Region, there is one community college that issued 28 awards on average annually (last 3 years) on this TOP code.

There are two other CTE educational institutions in the Bay Region issuing 49 awards on average annually (last 3 years ending 2020-22) on CIP 11.0201- Computer Programming/Programmer, General There is one other CTE educational institution in the Silicon Valley Sub-Region issuing 7 awards on average annually (last 3 years) on this CIP code.

Table 7a. Community College Awards on TOP 0707.00 - Computer Software Development in the Bay Region

College	Subregion	Associate Degree	High unit Certificate	Low unit Certificate	Total
Foothill	Silicon Valley	0	0	28	28
San Francisco	Mid-Peninsula	0	0	14	14
San Mateo	Mid-Peninsula	7	2	9	18
Solano	North Bay	0	0	4	4
Total	**-**	**7**	**2**	**55**	**64**

Source: Data Mart

Note: The annual average for awards is 2020-21 to 2022-23.

Table 7b. Other CTE Institutions Awards on CIP 11.0201- Computer Programming/Programmer, General in the Bay Region

College	Subregion	Bachelor's degree	Certificates of less than 1 year	Total
Dominican University of California	North Bay	42	0	42
University of Silicon Valley	Silicon Valley	6	1	7
Total	**-**	**48**	**1**	**49**

Source: Data Mart

Note: The annual average for awards is 2019-20 to 2021-22.

Gap Analysis

Based on the data included in this report, there is a labor market gap in the Bay Region with 13,688 annual openings for the Artificial Intelligence for Business occupational cluster and 113 annual (3-year average) awards for an annual undersupply of 13,575 students. In the Silicon Valley Sub-Region, there is also a gap with 4,546 annual openings and 35 annual (3-year average) awards for an annual undersupply of 4,511 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0707.00 - Computer Software Development

Metric Outcomes	Bay All CTE Program	Foothill College All CTE Program	State 0707.00	Bay 0707.00	Silicon Valley 0707.00	Foothill College0707.00
Students with a Job Closely Related to Their Field of Study	74%	88%	64%	61%	83%	83%
Median Annual Earnings for SWP Exiting Students	$53,090	$73,174	$50,797	$62,806	$87,006	$88,366

Metric Outcomes	Bay All CTE Program	Foothill College All CTE Program	State 0707.00	Bay 0707.00	Silicon Valley 0707.00	Foothill College0707.00
Median Change in Earnings for SWP Exiting Students	24%	42%	20%	21%	22%	21%
Exiting Students Who Attained the Living Wage	54%	66%	60%	65%	70%	70%

Source: Launchboard Strong Workforce Program Median of 2018 to 2021.

Skills, Certifications and Education

Table 9. Top Skills in Job Postings for Artificial Intelligence for Business Occupations in the Bay Region

Skill	Posting	Skill	Posting
Marketing	22,227	Data Science	8,203
Computer Science	18,144	Scalability	8,065
Python (Programming Language)	14,327	Business Development	7,267
Project Management	13,296	Finance	7,130
Product Management	12,718	Software Engineering	6,993
Machine Learning	12,196	Automation	6,798
Data Analysis	10,861	Workflow Management	6,346
New Product Development	9,396	Amazon Web Services	6,103
Artificial Intelligence	9,111	Agile Methodology	6,011
SQL (Programming Language)	9,037	Software Development	5,930

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Table 10. Certifications in Job Postings for Artificial Intelligence for Business Occupations in the Bay Region

Certification	Posting	Certification	Posting
Project Management Professional Certification	915	Epic EMR Certification	196
GIAC Certifications	273	Project Management Certification	151

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Table 11. Education Requirements for Artificial Intelligence for Business Occupations in the Bay Region

Education Level	Job Postings	% of Total
High school or GED	2,608	3%
Associate degree	1,714	2%
Bachelor's degree & higher	71,448	94%

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Note: 36% of records have been excluded because they do not include a degree level. As a result, the chart above may not be representative of the full sample.

Methodology

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

Sources

O*Net Online
Lightcast
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

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General Education Review Request
Area 1B - Oral Communication & Critical Thinking

Course Number & Title or Degree Program Name: Air Conditioning Mechanic Program
Indicate if this is: ☐ a course, or X a degree program

Overview:
Foothill College's General Education curriculum provides students with a well-rounded education, fostering critical thinking, communication, and interdisciplinary understanding. Faculty play a central role in ensuring GE courses align with these goals and prepare students for academic, professional, and civic success.

This form guides instructors in demonstrating how their course meets the learning outcomes for its designated GE area. Instructors should explain how their course develops analytical and communication skills, integrates diverse perspectives, and fosters interdisciplinary connections. Your contributions help maintain a rigorous and relevant GE curriculum that supports student achievement.

Breadth Criteria:
Foothill College's General Education curriculum equips students with broad and deep knowledge, preparing them to be independent thinkers and engaged members of a diverse society. GE courses encourage intellectual curiosity, interdisciplinary exploration, and critical engagement with the world.

Students gain exposure to a range of disciplines, including the arts, humanities, natural sciences, social sciences, and mathematics. This breadth fosters connections across fields and deepens understanding of cultural, social, and physical environments.

All GE courses emphasize critical analysis and ethical reasoning, challenging students to evaluate complex issues, articulate perspectives, and engage thoughtfully with diverse viewpoints. The curriculum also promotes equity, inclusion, and global awareness, ensuring students are prepared to contribute meaningfully to an interconnected world.

A completed GE pattern enables students to acquire, apply, and demonstrate competence in essential academic and professional competencies.

Depth Criteria for Area 1B - Oral Communication & Critical Thinking:
Courses in Oral Communication & Critical Thinking develop students' abilities to articulate ideas, evaluate arguments, and engage in reasoned decision-making. These courses emphasize the clear and logical expression of knowledge, information, and ideas, while fostering critical thinking skills to analyze, interpret, and respond to diverse viewpoints. Through oral presentations, discussions, and analytical exercises, students learn to communicate effectively and assess the validity of arguments and methodologies.

The curriculum promotes confidence, clarity, and ethical responsibility in communication, preparing students to participate actively and thoughtfully in academic, professional, and civic contexts.

General Education Review Request
Area 1B - Oral Communication & Critical Thinking

Instructions for Mapping Course Components to Criteria

Please follow the steps below to demonstrate how your course (or degree program) fulfills the Breadth and Depth criteria for General Education Area 1B - Oral Communication & Critical Thinking. Use specific components from the Course Outline of Record (COR), such as course outcomes, expanded content, methods of instruction/evaluation, and/or lab content.

If mapping a degree program, please indicate from which course in the sequence you are sourcing COR components.

Breadth Mapping

For each of the following competencies, indicate if and how your course or degree program meets the requirement and provide corresponding course component(s) from the COR.

1. **Communication**
   Analytical reading, writing, speaking, and listening skills, including evaluation, synthesis, and research.
   - Matching course component(s):

Building Trade Services students utilize fundamental communication skills throughout their program to achieve their course outcomes. Students must interpret construction documents and specifications to evaluate whether the systems perform as designed. They produce formal documentation using charts and reports to present findings from mechanical testing. Students must synthesis information demonstrated by converting measurements to Total Dynamic Head, chart data, and synthesize this into reports that evaluate operational compliance. Interaction, both verbal and in listening, with team members is essential to make sure the performance data and operational sequences perform accurately.

APSM 177A, (Year 4 Semester 4, Modules 23-ALL, Mechanical Acceptance Testing) Students learn the requirements to attain a mechanical acceptance technician certification through the International Certification Bureau. Students engage in communication orally, diagrammatically, and in written documents to understand the functioning of a building's system in order to test proper equipment functioning. Once the system's functioning is evaluated and compared to construction documents, the Service technician then documents the readings in formalized charts and presents the material for official project documentation.

APSM 174A, (Year 4 Semester 2, Modules 21-3, Measuring Pump Performance Data and Pump Curves) Students demonstrate the process of measuring a pump's performance. This information is correlated to a pump curve which plots readings of pressure and converts the readings to Todal Dynamic Head or pressure. This information is then categorized in chart form to verify the operating condition of a pump and back check this data against project documents and submittals.

General Education Review Request
Area 1B - Oral Communication & Critical Thinking

Communication is used to gain access to performance data information, sequence of operations, and pump access.

2. **Computation**
   Application of mathematical concepts or principles of data collection and analysis to solve problems.
   - Matching course component(s):

Building Trade Service Students are applying both measurement techniques and mathematical conversions to collect, analyze, and interpret airflow data—using that analysis to solve operational problems in mechanical systems. They do this specifically gathering raw pressure readings at multiple points within a duct system and converting the data into industry standard formulas. Students must use the data to solve problems such as inadequate fan performance, poor duct design, blockages, safety risks due to improper airflow, diagnose balancing issues and in determining causes for poor performing equipment.

APSM 173C, (Year 3 Semester 1, Module 19-5, Performing a Duct Traverse) Students perform the functions of a duct traverse which collects readings of pressure in a duct system. The pressure readings are then converted using mathematical formulas to cubic feet per minute of airflow (CFM). This data is used to detect deficiencies within a system such as fan operating issues, duct system design issues, obstructions within a system, and life safety concerns.

APSM 173C, (Year 3 Semester 1, Module 19-4, Measure Airflow at Registers) Students perform the functions of measuring air using various tools within the industry such as flow hoods, rotating vane anemometers, and air data multi meters. These readings are taken in units of pressure and applied to formulas to be converted to readings of cubic feet per minute of air. This data is used to solve problems within a system such as balancing concerns, system design issues, and equipment failures.

3. **Critical Expression**
   Clearly and precisely express ideas in a logical and organized manner using discipline-appropriate language.
   - Matching course component(s):

Students in the Building Trade Service are taught the importance of clear and critical communication for health and safety. For example, students collect and interpret multiple data sources—including manufacturer specs, field measurements, and project drawings—to calculate the total energy impact of a system. This consistency and correctness are important for the efficiency of the system which will impact other systems.

APSM 178C, (Year 5 Semester 4, Module 29-2, Energy Audits and Utility Structures) Students learn the process of energy auditing as it relates to a mechanical system. Students interpret manufacturer data, project drawings and take measurements to calculate the total energy impact of a building's system.

General Education Review Request
Area 1B - Oral Communication & Critical Thinking

APSM 157A, (Year 3 Semester 2, Module 14-9, Types of Drawings and Their Components) Students learn to read and interpret construction drawings and identify components within a system's drawings. This process involves a demonstration of the ability to locate equipment and interpret the symbols, measurements, and notes within construction drawings.

4. **Community and Global Awareness**
   Consideration of one's role in society at local, national, and global levels in the context of cultural constructs and historical/contemporary issues.
   - Matching course component(s):

Students in the Building Trade Service program are learning how to provide universal safety and health standards that expand all localities and cultural groups. The coursework teaches a sense of civic and global responsibility in students by connecting their technical knowledge to historical events, societal needs, and the health and safety of communities worldwide. Students examine case studies of major fire and smoke events from around the world (e.g., high-rise fires, transportation hubs), exploring how these tragedies led to safety codes and design innovations**.** By studying these incidents and their aftermaths, students gain insight into how public expectations and regulatory bodies evolve based on cultural values, safety needs, and technological capabilities. Additionally, students study the evolution of IAQ measures—from basic filtration and water treatment to modern certification systems, showing how societal health concerns have shaped the mechanical trades over time.

APSM 180C, (Year 3 Semester 3, Module 17-4, Indoor Air Quality) Students learn the process of auditing a building's indoor air quality. The students engage in classroom discussion and hands on activities to achieve the indoor air quality certification through the International Certification Bureau.

APSM 174C, (Year 4 Semester 4, Module 24-11, Fire Smoke Damper Training) Students learn the historical data which governs current Fire Smoke Damper installation and design within a system. Current developments in smoke mitigation derived from catastrophic case studies, which have been compiled globally, and the codes which stemmed from these catastrophes have altered smoke control plans, and code cycles which govern building standards.

5. **Information and Digital Literacy**
   The set of integrated abilities that includes: the reflective discovery of information, the understanding of how information is produced and valued, the use of information in creating new knowledge, the ethical participation in communities of learning, and the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.
   - Matching course component(s):

Students in the Building Trade Service program are taught how to responsibly access and use technical data through digital tools to solve real-world system issues in an environmentally responsible and ethically sound manner. Students must assess what data is needed (e.g., system pressure, temperature, flow rates) to properly program automation systems and achieve design goals. Then they analyze the collected system data and apply it in configuring automated controls—ensuring efficient, responsive system performance under varying loads. Students engage with building automation

software**,** control interfaces, and digital instrumentation to actively program and adjust systems based on real-time feedback.

APSM 156A, (Year 2 Semester 1, Module 7-1, Heat Pumps) Service Apprentices learn how to evaluate submittal documents from vendors and confirm proper function of Heat Pumps in a system. Correct installation, functioning and maintenance is critical in reducing a building's energy and environmental impact. The service technician uses digital tools to take readings of pressure, and airflow to operating conditions and compare these conditions to submittal data.

APSM 181C, (Year 5 Semester 2, Module 26-3, Building Automation Controls and Advanced Technologies) Students perform the functions of programming an automated system to control components. The test records measurements of pressure, flow, and temperature used to correctly adapt and control a system to achieve a design standard.

Depth Mapping

<u>Mandatory</u> Depth Outcomes

Your course must address all the following outcomes. For each outcome, map the corresponding course component(s) from the COR.

1. **Effective Oral Communication**
   Clearly and precisely express ideas in a logical and organized manner using discipline-appropriate language.
   - Matching course component(s):

Building Trade Service students are taught the communication practices of the industry. Through classroom discussions and communication with business representatives, students learn how to articulate concerns, ask questions, and convey information within the industry professional practices. Students are instructed how to use industry- and union-specific terminology related to labor rights, reporting procedures, and contractual obligations, which is essential for effective professional dialogue in the field.

Similarly, students must learn appropriate on the job communication. Students must understand and apply the sequencing of operations within control systems and logically interpret and explain system behavior based on interface feedback. When diagnosing deficiencies or communicating service needs, students are required to verbally describe system functions and faults using structured, concise, and technically appropriate language. Students engage with operator interfaces, system diagrams, and diagnostic tools—requiring fluency in terminology related to control logic, sensor data, equipment settings, and fault codes**.** Often students resolve problems through troubleshooting and must discuss their strategies and solutions through presentations, or verbal explanations during labs, where they explain and defend their approach to instructors or peers.

General Education Review Request
Area 1B - Oral Communication & Critical Thinking

APSM 151A, (Year 1 Semester 1, Module 1-4, Discussion with Business Representatives) Students engage in classroom discussion and outline the guidelines of the Collective Bargaining agreement of the Sheet Metal Workers. Students learn the proper procedures for documenting and reporting work hours and maintaining the integrity of the collective bargaining agreement throughout the apprenticeship. Students build a communication channel to the business representatives of the Local and establish points of contact for potential issues related to the collective bargaining agreement.

APSM 181B, (Year 5 Semester 1, Module 25-3, Operator Interfaces) Students learn the process of controlling an HVAC system using an operator interface. This is a categorized and logical sequencing of HVAC controls, which allows the technician to operate equipment in trouble shooting scenarios. Understanding system diagrams, and communication interfaces, allows the technician to perform services on an existing system, and provide insight to any decencies detected in devices or design.

2. **Critical Evaluation of Ideas**
   Critically assess the ideas of others, organize and refine their own ideas, and articulate a well-reasoned position.
   - Matching course component(s):

Building Trade Service students evaluate existing building system controls, which are typically the work of previous engineers or technicians. This requires them to understand and critique the logic and design behind someone else's programming and control strategies. As they manipulate and program DDC (Direct Digital Control) systems, students must develop and refine their own control strategies. They adjust their programming in response to lab scenarios, test outcomes, and user needs. To explain why they chose certain programming strategies or how they isolated specific faults, students must justify their choices based on technical reasoning, system knowledge, and customer or design requirements. This likely takes the form of lab reports, presentations, or verbal explanations during troubleshooting labs, where they explain and defend their approach to instructors or peers.

APSM 177B, (Year 5 Semester 1, Module 27-1, Direct Digital Control Strategies) Students learn how to evaluate existing building system controls and troubleshoot failures within the system based on applied lab sessions. The students learn how to program DDC controls and can manipulate the system's functioning to achieve a desired outcome dictated by the customer or contract drawings. This process involves system knowledge, and reasoning skills to isolate issues in a control system.

APSM 177B, (Year 5 Semester 1, Module 27-2, Supervisory Control Strategies Control Strategies) Students learn how to evaluate existing building system controls and troubleshoot failures within the system based on applied lab sessions. The students learn how to program DDC controls and can manipulate the system's functioning to achieve a desired outcome dictated by the customer or contract drawings. This process involves system knowledge, and reasoning skills to isolate issues in a control system.

General Education Review Request
Area 1B - Oral Communication & Critical Thinking

3. **Analytical Thinking**
   Analyze and evaluate arguments, identifying underlying assumptions, strengths, weaknesses, and implications.
   - Matching course component(s):

Building Trade Service students learn to recognize and dissect underlying assumptions, critically evaluate safety-related decisions, and understand their broader consequences. They focus on health risks, fatal incidents, and real-world case studies learning from tangible examples where argument analysis is vital for both the worker and public safety. The instruction challenges the assumption that life safety equipment like fire/smoke dampers will function correctly indefinitely without maintenance. Students critically assess the logic of maintenance practices and the effectiveness of current safety protocols.

APSM 152C, (Year 1 Semester 2, Module 3-3, OSHA Health and Safety Management) Students learn the guidelines to OSHA safety Health and management systems. This course reviews the assumptions in construction which have led to workplace injuries. Assumptions range from exposure to toxic chemicals, silica exposure, and the focus four hazards. When working in construction often assumptions about material composition without reviewing safety data sheets or signage, can lead to workplace exposure, injury and potential fatalities.

APSM 174C, (Year 4 Semester 4, Module 24-2, Fire Smoke Damper Technician Certification Exam) Students take the certification exam through the International Certification Bureau to becoming a Fire Smoke Damper Technician. This training involves an in-depth study of the effects of failed equipment as it relates to the smoke control plan of a building. Assumptions related to the functioning of this equipment without annual inspections can lead to life safety concerns, and occupancy mortalities. This has been seen in fire studies throughout the United States where failure to mitigate smoke within egress routes has resulted in mass casualties.

4. **Ethical and Responsible Communication**
   Demonstrate an understanding of the ethical responsibilities associated with effective communication and argumentation.
   - Matching course component(s):

Building Trade Service students are taught to responsibly communicate when they lack knowledge or experience—an ethical act that protects both individual and team safety. Admitting limitations rather than pretending competence is a core ethical communication behavior, especially in hazardous work environments. Students also must learn about respecting the construction crew hierarchy, which requires ethical awareness of when, how, and to whom concerns should be voiced. When raising safety concerns or requesting clarification, students must do so thoughtfully, often needing to support their position, which involves ethical reasoning and justification. By reviewing apprentice policies, students learn that failing to communicate responsibly has tangible professional consequences. Upholding transparency and accountability reflect an ethical approach to workplace communication.

General Education Review Request
Area 1B - Oral Communication & Critical Thinking

APSM 151A, (Year 1 Semester 1, Module 1-9, Introduction to the Trade) Students gain knowledge to the roles and responsibilities of members of the construction crew. Students learn the hierarchy of construction crews, and gain communication tools to effectively communicate issues relating to a lack of knowledge about the trade tasks, safety concerns, and industry accepted etiquette to communicate.

APSM 155C, (Year 3 Semester 1, Module 13-5Review of Apprentice Policies) Throughout the apprenticeship, students review the apprentice policies which highlight proper communication to avoid issues progressing through the apprenticeship program. Communication is highlighted in sections which relate to absences, tardies, and layoff procedures. Professional communication is crucial in the apprenticeship program and in the on-the-job training and is echoed not only in this lesson, but throughout the apprenticeship.

5. **Problem-Solving Through Communication**
   Apply communication and critical thinking skills to resolve problems and make informed decisions.
   - Matching course component(s):

Building Trade Service students must recognize, evaluate, and interpret potential hazards on a job site. This involves applying OSHA guidelines, understanding risk levels, and deciding on appropriate mitigation steps. Students are trained in how to properly report hazards through documentation and to the correct organizational contacts. This ensures problems are addressed swiftly and clearly, reducing miscommunication that could lead to injuries or violations.

Another area where critical thinking and decision making is of most importance is in a medical emergency, where students must learn to clearly and calmly communicate key information—such as the location of the incident, the condition of the injured person, and what actions have been taken—to emergency responders and colleagues. Students practice assessing the scene, determining if CPR or first aid is appropriate, and making split-second decisions about the next steps. This includes deciding when and how to intervene, delegate, or escalate the situation.

Throughout the program students apply their training in identifying problems, analyzing risks, communicating effectively under pressure, and making well-informed, safety-critical decisions.

APSM 152C, (Year 1 Semester 1, Module 1-9, Introduction to OSHA)
Students learn the proper procedure for identifying and reporting hazards in a construction environment. This process covers OSHA guidelines, organizational contact information, and provides situational awareness for an apprentice to identify and mitigate hazards which have been outlined in OSHA requirements. Informed decisions such as “stop work” orders are made when issues of safety have been neglected creating hazards and students learn the proper documentation and reporting.

APSM 151A, (Year 1 Semester 2, Module 1-7, CPR First Aid) Students learn the process of administering CPR and first aid in a construction environment and resolving potential medical concerns while waiting for emergency responders. Students practice communication to notify emergency

responders, providing locational information, and communicating with any personnel able to assist with administering first aid and CPR. Communication is paramount in this process by getting information from the inured if possible, coordinating emergency responders, and directing personnel to assist with the process.

Optional Depth Outcomes

In addition to the mandatory outcomes, your course or sequence must address **at least two** of the following outcomes. For each selected outcome, map the corresponding course component(s).

1. **Listening and Interpretation**
   Develop active listening skills to accurately interpret and respond to spoken messages.
   - Matching course component(s):

Throughout the application of the business trade service program, students must listen for key information that they will later use to perform efficiencies. To do this a foundation of listening is built within the course lecturers as students are trained to listen for signal words, key industry terminology, and main ideas during lectures—skills that are fundamental to active listening. The process of note-taking based on spoken instruction ensures students are not only hearing but processing and interpreting information in real time. By documenting and later referencing this material, students demonstrate that they have accurately understood what was communicated. Students use their notes to craft a formal request for information (RFI), which reflects their ability to respond meaningfully to what was said.

APSM 151A, (Year 1 Semester 1, Module 1-2, Classroom Survival Skills) Students learn the process of note taking as it related to lecture classes. Students identify signal words and take notes in a lecture environment. These notes are then used to write a formal request for information to the instructor properly identifying key points and signal words used in lectures and in the industry of HVAC.

2. **Rhetorical Strategies**
   Utilize rhetorical techniques to adapt messages to diverse audiences and purposes.
   - Matching course component(s):

3. **Collaborative Communication**
   Engage effectively in group discussions, demonstrating teamwork and interpersonal communication skills.
   - Matching course component(s):

General Education Review Request
Area 1B - Oral Communication & Critical Thinking

Building Trade Service students are encouraged to participate in class discussions and share their personal experiences and opinions. The program brings together a diverse group of individuals from different backgrounds, united by a shared commitment to professionalism and skilled work. Students are supported in expressing diverse perspectives, listening actively, and responding constructively key interpersonal communication skills valued in both academic and professional settings.

Through small group work, students analyze real-world scenarios (e.g., workplace conflict, hiring bias, customer interactions) and are tasked with reaching consensus on how bias may affect outcomes. These collaborative activities require problem-solving, compromise, and shared responsibility, mirroring the expectations of teamwork in real-world job sites.

APSM 151A, (Year 1 Semester 1, Module 1-2, Bias and Belonging) Students learn the effects of implicit bias and discuss as a class tools to address inner bias. Throughout the course, this training highlights the interpersonal relationships between employees, customers, teachers, and leaders and develops tools to address personal bias as it relates to decision making.

4. **Cultural Awareness**
   Recognize and respect cultural differences in communication styles and adapt accordingly.
   - Matching course component(s):

5. **Application Across Disciplines**
   Apply oral communication and critical thinking skills to analyze problems and arguments in other academic disciplines.
   - Matching course component(s):

Submit your completed form to your Division Curriculum Reps

Requesting Faculty: Gina Fitzpatrick Date: 5/13/25

Division Curriculum Rep: Tim Myres Date: 5/19/25

FOR USE BY CURRICULUM OFFICE:

Approved: ___ Denied: ____ CCC Co-Chair Signature: _____Date: _____

General Education Review Request
Area 1B - Oral Communication & Critical Thinking

Degree Program Addendum

If you are submitting a complete degree program (sequence of courses) to fulfill the requirements for this General Education Area, please provide a justification for why a sequence is being proposed instead of a single course. This justification must clearly demonstrate how the sequence, taken as a whole, meets the **Breadth** and **Depth** criteria outlined for this area.

The justification should also touch on how the sequence of courses:

Integrates learning outcomes (The sequence is designed as a cohesive program where learning outcomes are distributed across courses to achieve the required breadth and depth.)

and provides

Progressive development (The sequence builds skills or knowledge progressively, with later courses dependent on foundational learning established in earlier ones.)

Instructions for Mapping Degree Programs

1. Identify which courses in the sequence address specific **Mandatory Depth Outcomes** and **Optional Depth Outcomes**.
2. Provide a clear explanation of how each course contributes to fulfilling the **Breadth** criteria, noting any overlaps or unique contributions within the sequence.
3. Ensure the justification highlights the interdependence and integration of the courses within the sequence.

Example:
Course A introduces foundational concepts in literature and philosophy, addressing Depth Outcomes 1 and 3. Course B expands on these foundations through artistic and historical analysis, addressing Depth Outcomes 2, 4, and 5. Together, the sequence fulfills all mandatory outcomes and optional outcomes 1 and 3.

Your Response:

The Building Trade Service program is a holistic program of study for students in the air-conditioning mechanics apprenticeship program. The academic training students receive is not dispensed in the traditional model of a single course focused on a specific academic discipline; rather, the BTS sequence of courses introduces students early on to concepts and ideas that they then need to practice and refine as the sequence of courses continues across the five years of the program. From the start of the BTS program, students gain knowledge through an OSHA 30 qualification, as referenced in the mandatory depth criteria as APSM 152C, (Year 1 Semester 1, Module 1-9, Introduction to OSHA). This program ties directly into subsequent referenced classes such as mandatory depth criteria APSM 152C, (Year 1 Semester 2, Module 3-3, OSHA Health and Safety Management), where students are empowered to communicate and report hazards of a

jobsite. This knowledge of safety allows students to work in a construction environment and identify proper communication to eliminate or control hazards as defined by OSHA, relating to all subsequent classes in a construction setting. Students learn to work collaboratively in groups, referenced in the optional depth criteria as APSM 151A, (Year 1 Semester 1, Module 1-2, Bias and Belonging). This course ties directly into the referenced course APSM 151A, (Year 1 Semester 1, Module 1-9, Introduction to the Trade) as it teaches addressing personal bias when working in groups collaboratively guiding students for a career in the construction field and making ethical decisions.

Students in the BTS program begin learning quantitative reasoning in their first service introduction and safety class, but they are challenged to then deepen their understanding of these concepts and ideas in classes later in the program like Plans & Specifications for the Service Technician and Hydronic Systems, Pumps & Hydronic Balancing. Testing students' knowledge in new situations, including in on the job work performance is a feature of the apprenticeship program.

The BTS program applications reflect this approach both in breadth and depth. For example, the communications breadth standard is met throughout the program as students are required to write up their findings, give presentations to stakeholders and fellow students, and communicate in the language of the industry and the profession. This breadth requirement is further underscored by the depth requirements of the oral communication and critical thinking GE standards where students are taught to employ logic and consider audience when writing and presenting.

The BTS program is more than the sum of its parts. It reflects a more nuanced approach to teaching and learning, one that is constantly providing context and meaning for students as they are learning and progressing through the program, and one not easily untangled from the program as a whole. It may be more useful, then, to think of this program as one enormous classroom, a classroom in which all GE disciplines are happening all at once. If you trace snapshots of the curriculum over the five years, you will see the learning unfolding, but you don't get the whole picture from a single course in the program. These students aren't majoring in a program they are becoming its practitioners.

General Education Review Request
Area 2 - Mathematical Concepts & Quantitative Reasoning

Course Number & Title or Degree Program Name: Air Conditioning Mechanic Program
Indicate if this is: ☐ a course, or X a degree program

Overview:
Foothill College's General Education curriculum provides students with a well-rounded education, fostering critical thinking, communication, and interdisciplinary understanding. Faculty play a central role in ensuring GE courses align with these goals and prepare students for academic, professional, and civic success.

This form guides instructors in demonstrating how their course meets the learning outcomes for its designated GE area. Instructors should explain how their course develops analytical and communication skills, integrates diverse perspectives, and fosters interdisciplinary connections. Your contributions help maintain a rigorous and relevant GE curriculum that supports student achievement.

Breadth Criteria:
Foothill College's General Education curriculum equips students with broad and deep knowledge, preparing them to be independent thinkers and engaged members of a diverse society. GE courses encourage intellectual curiosity, interdisciplinary exploration, and critical engagement with the world.

Students gain exposure to a range of disciplines, including the arts, humanities, natural sciences, social sciences, and mathematics. This breadth fosters connections across fields and deepens understanding of cultural, social, and physical environments.

All GE courses emphasize critical analysis and ethical reasoning, challenging students to evaluate complex issues, articulate perspectives, and engage thoughtfully with diverse viewpoints. The curriculum also promotes equity, inclusion, and global awareness, ensuring students are prepared to contribute meaningfully to an interconnected world.

A completed GE pattern enables students to acquire, apply, and demonstrate competence in essential academic and professional competencies.

Depth Criteria for Area 2 - Mathematical Concepts & Quantitative Reasoning:
Courses in Mathematical Concepts & Quantitative Reasoning equip students with the skills needed to understand and analyze numerical, graphical, and symbolic information. These courses emphasize mathematical reasoning, problem-solving, and the ability to apply quantitative concepts to real-world contexts. Students develop competencies in interpreting data, identifying patterns, and solving problems using mathematical models and tools.

The curriculum promotes logical thinking, precision, and accuracy, enabling students to make informed decisions in academic, professional, and everyday situations.

General Education Review Request
Area 2 - Mathematical Concepts & Quantitative Reasoning

Instructions for Mapping Course Components to Criteria

Please follow the steps below to demonstrate how your course (or degree program) fulfills the Breadth and Depth criteria for General Education Area 2 - Math Concepts & Quantitative Reasoning. Use specific components from the Course Outline of Record (COR), such as course outcomes, expanded content, methods of instruction/evaluation, and/or lab content.

If mapping a degree program, please indicate from which course in the sequence you are sourcing COR components.

Breadth Mapping

For each of the following competencies, indicate if and how your course or degree program meets the requirement and provide corresponding course component(s) from the COR.

1. **Communication**
   Analytical reading, writing, speaking, and listening skills, including evaluation, synthesis, and research.
   - Matching course component(s):

Building Trade Service students utilize fundamental communication skills throughout their program to achieve their course outcomes. Students must interpret construction documents and specifications to evaluate whether the systems perform as designed. They produce formal documentation using charts and reports to present findings from mechanical testing. Students must synthesis information demonstrated by converting measurements to Total Dynamic Head, chart data, and synthesize this into reports that evaluate operational compliance. Interaction, both verbal and in listening, with team members is essential to make sure the performance data and operational sequences perform accurately.

APSM 177A, (Year 4 Semester 4, Modules 23-ALL, Mechanical Acceptance Testing) Students learn the requirements to attain a mechanical acceptance technician certification through the International Certification Bureau. Students engage in communication orally, diagrammatically, and in written documents to understand the functioning of a building's system in order to test proper equipment functioning. Once the system's functioning is evaluated and compared to construction documents, the Service technician then documents the readings in formalized charts and presents the material for official project documentation.

APSM 174A, (Year 4 Semester 2, Modules 21-3, Measuring Pump Performance Data and Pump Curves) Students demonstrate the process of measuring a pump's performance. This information is correlated to a pump curve which plots readings of pressure and converts the readings to Todal Dynamic Head or pressure. This information is then categorized in chart form to verify the operating condition of a pump and back check this data against project documents and submittals.

General Education Review Request
Area 2 - Mathematical Concepts & Quantitative Reasoning

Communication is used to gain access to performance data information, sequence of operations, and pump access.

2. **Computation**
   Application of mathematical concepts or principles of data collection and analysis to solve problems.
   - Matching course component(s):

Building Trade Service Students are applying both measurement techniques and mathematical conversions to collect, analyze, and interpret airflow data—using that analysis to solve operational problems in mechanical systems. They do this specifically gathering raw pressure readings at multiple points within a duct system and converting the data into industry standard formulas. Students must use the data to solve problems such as inadequate fan performance, poor duct design, blockages, safety risks due to improper airflow, diagnose balancing issues and in determining causes for poor performing equipment.

APSM 173C, (Year 3 Semester 1, Module 19-5, Performing a Duct Traverse) Students perform the functions of a duct traverse which collects readings of pressure in a duct system. The pressure readings are then converted using mathematical formulas to cubic feet per minute of airflow (CFM). This data is used to detect deficiencies within a system such as fan operating issues, duct system design issues, obstructions within a system, and life safety concerns.

APSM 173C, (Year 3 Semester 1, Module 19-4, Measure Airflow at Registers) Students perform the functions of measuring air using various tools within the industry such as flow hoods, rotating vane anemometers, and air data multi meters. These readings are taken in units of pressure and applied to formulas to be converted to readings of cubic feet per minute of air. This data is used to solve problems within a system such as balancing concerns, system design issues, and equipment failures.

3. **Critical Expression**
   Clearly and precisely express ideas in a logical and organized manner using discipline-appropriate language.
   - Matching course component(s):

Students in the Building Trade Service are taught the importance of clear and critical communication for health and safety. For example, students collect and interpret multiple data sources—including manufacturer specs, field measurements, and project drawings—to calculate the total energy impact of a system. This consistency and correctness are important for the efficiency of the system which will impact other systems.

APSM 178C, (Year 5 Semester 4, Module 29-2, Energy Audits and Utility Structures) Students learn the process of energy auditing as it relates to a mechanical system. Students interpret manufacturer data, project drawings and take measurements to calculate the total energy impact of a building's system.

General Education Review Request
Area 2 - Mathematical Concepts & Quantitative Reasoning

APSM 157A, (Year 3 Semester 2, Module 14-9, Types of Drawings and Their Components) Students learn to read and interpret construction drawings and identify components within a system's drawings. This process involves a demonstration of the ability to locate equipment and interpret the symbols, measurements, and notes within construction drawings.

4. **Community and Global Awareness**
   Consideration of one's role in society at local, national, and global levels in the context of cultural constructs and historical/contemporary issues.
   - Matching course component(s):

Students in the Building Trade Service program are learning how to provide universal safety and health standards that expand all localities and cultural groups. The coursework teaches a sense of civic and global responsibility in students by connecting their technical knowledge to historical events, societal needs, and the health and safety of communities worldwide. Students examine case studies of major fire and smoke events from around the world (e.g., high-rise fires, transportation hubs), exploring how these tragedies led to safety codes and design innovations**.** By studying these incidents and their aftermaths, students gain insight into how public expectations and regulatory bodies evolve based on cultural values, safety needs, and technological capabilities. Additionally, students study the evolution of IAQ measures—from basic filtration and water treatment to modern certification systems, showing how societal health concerns have shaped the mechanical trades over time.

APSM 180C, (Year 3 Semester 3, Module 17-4, Indoor Air Quality) Students learn the process of auditing a building's indoor air quality. The students engage in classroom discussion and hands on activities to achieve the indoor air quality certification through the International Certification Bureau.

APSM 174C, (Year 4 Semester 4, Module 24-11, Fire Smoke Damper Training) Students learn the historical data which governs current Fire Smoke Damper installation and design within a system. Current developments in smoke mitigation derived from catastrophic case studies, which have been compiled globally, and the codes which stemmed from these catastrophes have altered smoke control plans, and code cycles which govern building standards.

5. **Information and Digital Literacy**
   The set of integrated abilities that includes: the reflective discovery of information, the understanding of how information is produced and valued, the use of information in creating new knowledge, the ethical participation in communities of learning, and the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.
   - Matching course component(s):

Students in the Building Trade Service program are taught how to responsibly access and use technical data through digital tools to solve real-world system issues in an environmentally responsible and ethically sound manner. Students must assess what data is needed (e.g., system pressure, temperature, flow rates) to properly program automation systems and achieve design goals. Then they analyze the collected system data and apply it in configuring automated controls—ensuring efficient, responsive system performance under varying loads. Students engage with building automation

software**,** control interfaces, and digital instrumentation to actively program and adjust systems based on real-time feedback.

APSM 156A, (Year 2 Semester 1, Module 7-1, Heat Pumps) Service Apprentices learn how to evaluate submittal documents from vendors and confirm proper function of Heat Pumps in a system. Correct installation, functioning and maintenance is critical in reducing a building's energy and environmental impact. The service technician uses digital tools to take readings of pressure, and airflow to operating conditions and compare these conditions to submittal data.

APSM 181C, (Year 5 Semester 2, Module 26-3, Building Automation Controls and Advanced Technologies) Students perform the functions of programming an automated system to control components. The test records measurements of pressure, flow, and temperature used to correctly adapt and control a system to achieve a design standard.

Depth Mapping

<u>Mandatory</u> Depth Outcomes

Your course must address all the following outcomes. For each outcome, map the corresponding course component(s) from the COR.

1. **Mathematical Reasoning**
   Apply mathematical reasoning to analyze and solve problems using numerical, graphical, or symbolic methods.
   - Matching course component(s):

Students in the Building Trade Service program learn and apply mathematical reasoning throughout their course of study and at on-the-job work locations where they are required to demonstrate their learning and training in real world situations. The learning outcomes from the CORs from the program illustrate both the level of mathematical reasoning required to complete the program, and the depth of application the students are required to display. All of these concepts and applications require a degree of numeracy and calculi that speak to the level of mathematical reasoning BTS students must learn and deploy.

APSM 152C: INTRODUCTION TO ELECTRICITY:

- Use an electrical multi-meter to take electrical measurements
- List the units of measurement for electricity
- Understand the different units of measurement for electricity (voltage, amperage, resistance)
- State the formula for determining electrical power
- Explain inductance
- Apply electrical units of measure to conductor sizing
- State the reasons for using proper size wires

General Education Review Request
Area 2 - Mathematical Concepts & Quantitative Reasoning

APSM 154A: REFRIGERATION IN AIR CONDITIONING

- Understand refrigeration as applied to air conditioning systems
- Explain three ways in which heat transfers into a structure
- State two ways that air is conditioned for cooling
- Calculate the correct operating suction pressures for both standard and high efficiency air conditioning equipment under various operating condition
- Calculate the standard operating discharge pressures at various ambient conditions
- Explain how "high efficiency" is accomplished

2. **Data Analysis and Interpretation**
   Read, interpret, and analyze data presented in various forms, including graphs, charts, and tables.
   - Matching course component(s):

BTS students are required to read, interpret and analyze data in order to successfully complete their program of study. Students must analyze graphs and charts and tables to determine the correct airflow through an HVAC system as well as read blueprints and schematics in order to understand the role of an HVAC system within an entire building. The quantitative reasoning needed to carry out the requirements of the program, ask students to apply their learning to interpreting graphs and charts and to articulate their understanding of these documents in both mathematical and lay terms.

APSM 155C: MAINTAINING EFFICIENT OPERATION OF ELECTRIC COOLING & HEATING EQUIPMENT

- Explain and perform start-up, diagnosis, repair and maintenance of gas heating/electric cooling package units and split systems
- Start-up sheets
- Reasons for start-up sheets, both mechanical and legal
- Examples of different start-up sheets; discussion of differences
- How a start-up sheet can be used for troubleshooting (Lec and Lab)
- Maintenance
- Perform procedures and diagnostics typically performed at the various levels of preventative maintenance
- Describe importance of maintenance to companies
- Importance of customer relationships
- Soft skills—generate revenue for the company and provide the customer with good service
- Demonstrate the ability, both verbally and in writing proposals, for additional work over and above maintenance contracts
- Perform preventative maintenance on various types of systems in the lab (Lec and Lab)

General Education Review Request
Area 2 - Mathematical Concepts & Quantitative Reasoning

3. **Application of Quantitative Methods**
   Use quantitative methods to model real-world situations and predict outcomes.
   - Matching course component(s):

The Building Trade Service program has been developed from the beginning to teach students how their study is implemented in real-world situations. Students are required to apply their leaning on active job sites where their knowledge and instruction are employed throughout the entire construction process. Given their role in planning and installing HVAC systems in industrial and commercial buildings, BTS students are always using quantitative methods to model the real-world impacts of their work on actual buildings and construction sites.

APSM 157A: PLANS & SPECIFICATIONS FOR THE SERVICE TECHNICIAN

- Explain the organization of construction documents (plans and specifications)
- Identify site, architectural, structural, mechanical, electrical, control, and specialty drawing sections of the plans
- Identify the list of divisions in the specifications
- Define line types, symbols, and abbreviations typically used on plans and specifications
- Identify and use plan views, elevation views, coordinates, section views, isometric drawings, and detail drawings
- Find specific information about a project in the plans and specifications provided, as typically referenced by service technicians
- Refer to equipment schedules, specifications, and submittals to prepare for "start-up" of new equipment
- Use contract documents to prepare a detailed order list of filters, belts, refrigerant and other maintenance items as assigned
- Compare typical residential drawings with typical commercial drawings
- Determine ordering information for a thermostat sensor and associated wiring in each commercial project, versus a given residential project
- Prepare an order for a replacement compressor for an air conditioner on a commercial building using plans, specifications, and submittals
- Prepare an order for a replacement compressor for an air conditioner on a residential project using plans, specifications, and submittals

APSM 156C: CHILLED WATER HVAC SYSTEMS & COMPONENTS

- Explain the purpose and some applications of chillers
- Explain the purpose and some applications of chillers
- Identify and explain difference between industrial and commercial chillers
- Identify the types of chillers
- Identify the types of chilled water systems
- Explain the difference between direct expansion and flooded chiller evaporators
- State the type of compressor used in low pressure chiller systems
- Describe the operation of a centrifugal compressor in a high-pressure chiller
- Explain the purge system used on a low-pressure chiller condenser

- Describe the absorption cooling system process
- State the cooling medium generally used on large absorption chillers

4. **Logical and Systematic Problem-Solving**
   Develop logical and systematic approaches to problem-solving, including identifying goals and constraints.
   - Matching course component(s):

BTS students learn logical and systematic approaches to problem solving throughout their program. All students are required to learn problem solving techniques from day one in their program. Indeed BTS, like nearly all apprenticeship programs, is based on a problem-solving model. That is, students are taught to approach their formal study and their on-site work tasks as problems to be solved, and of necessity this work requires students to identify their goals as part of a larger whole, and to articulate any constraints to achieving those goals to a community of stakeholders.

APSM 157A: PLANS & SPECIFICATIONS FOR THE SERVICE TECHNICIAN

- Explain the organization of construction documents (plans and specifications)
- Identify site, architectural, structural, mechanical, electrical, control, and specialty drawing sections of the plans
- Identify the list of divisions in the specifications
- Define line types, symbols, and abbreviations typically used on plans and specifications
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- Prepare an order for a replacement compressor for an air conditioner on a residential project using plans, specifications, and submittals

APSM 155A: SHEET METAL FABRICATION

- Basic sheet metal shop equipment
- Explain the purpose and use of different types of shop equipment
- Safely use the shop equipment designated by instructor

- Seams, locks, edges, and allowances
- Form and use hem and double hem
- Form and use standing seam and Pittsburgh seam
- Fabricate and use an end cap
- Form and use a clinch lock
- Basic layout
- Name common layout tools and explain their use
- Measure and fabricate duct plenums and transitions
- Layout and fabricate a rectangular duct
- Layout and fabricate a rectangular transition
- Identify other fittings utilized to efficiently convey air in a duct system
- Layout and fabricate an offset
- Layout and fabricate an elbow
- Layout and fabricate a saddle tap
- Layout and fabricate a 45-degree shoe tap
- Layout and fabricate a square to round

5. **Communication of Quantitative Ideas**
   Clearly express quantitative ideas and solutions using appropriate mathematical language and notation.
   - Matching course component(s):

Because BTS students are always required to conduct part of their learning on active job sites, it is critical that they be able to express many concepts and ideas, including quantitative ideas and solutions, to a wider audience and set of stakeholders. For example, BTS students must use their quantitative reasoning skills to both interpret schematics and blueprints, and report back questions and/or responses to stakeholders from contractors to other tradespeople. Math is the common language of all the building trades. No successful apprenticeship student in the Building Trade Service program or any other apprenticeship program could complete their program without substantial quantitative reasoning abilities and the concomitant communications needed to carry out their work.

APSM 153A: FIELD INSTALLATION FOR THE SERVICE TECHNICIAN

- Understand the process of field installation
- Understand the equipment installation requirements overview (as per SMACNA standard, code requirements, and manufacturer's requirements)
- Find and perform penetration layout
- Understand the requirements of curb installation
- Understand the fire and smoke dampers installation overview as per code and manufacturer's requirements
- Understand the procedures of equipment start-up
- Achieve crane and rigging qualification

- Practice aerial lift safety

APSM 154B: GAS & ELECTRIC HEATING

- Explain the application and operational sequence of electric and gas heating
- Explain electrical heating components and controls
- Troubleshoot electric heating
- Explain gas heating components
- Perform gas pressure measurements and gas pipe sizing
- Describe the process of combustion
- Understand and demonstrate the use of flue gas analysis instruments
- Describe the function of different types of gas valves
- Understand the requirements for sizing and installation of all types of venting for gas heat
- Troubleshoot and perform maintenance of gas heating
- Explain special requirements for propane heating

Optional Depth Outcomes

In addition to the mandatory outcomes, your course or sequence must address **at least two** of the following outcomes. For each selected outcome, map the corresponding course component(s).

1. **Technology in Quantitative Reasoning**
   Use current technologies and tools for quantitative analysis and problem-solving.
   - Matching course component(s):

The HVAC industry and the BTS students' role in it is heavily reliant on modern technology to provide precise data and the students in the program must then use their quantitative reasoning to interpret that data and suggest a course of action. And because the data BTS students must interpret cover everything from state and federal safety standards to project critical installations, their program of study emphasizes the importance of the accuracy of their data analysis and indeed students must pass several assessments before advancing through the program.

APSM 155C: MAINTAINING EFFICIENT OPERATION OF ELECTRIC COOLING & HEATING EQUIPMENT

- Explain theory and operation of inverter technology
- Explain the capabilities and advantages of modulated refrigerant flow for energy efficiency
- Explain how voltage is inverted to enable a compressor to modulate refrigerant flow
- Perform installation, repair and maintenance of variable refrigerant flow (VRF) systems
- Demonstrate piping techniques required for installation of VRF and heat recovery systems
- Explain and demonstrate refrigerant charging procedures required for VRF and heat recovery systems
- Explain operation of heat recovery systems
- Explain how heat is recovered and utilized in a heat recovery system
- Install, maintain and repair heat recovery systems

- Install and charge an inverter and heat recovery system
- Discuss troubleshooting of inverter and heat recovery systems

APSM 157A: PLANS & SPECIFICATIONS FOR THE SERVICE TECHNICIAN

- Explain the organization of construction documents (plans and specifications)
- Identify site, architectural, structural, mechanical, electrical, control, and specialty drawing sections of the plans
- Identify the list of divisions in the specifications
- Define line types, symbols, and abbreviations typically used on plans and specifications
- Identify and use plan views, elevation views, coordinates, section views, isometric drawings, and detail drawings
- Find specific information about a project in the plans and specifications provided, as typically referenced by service technicians
- Refer to equipment schedules, specifications, and submittals to prepare for "start-up" of new equipment
- Use contract documents to prepare a detailed order list of filters, belts, refrigerant and other maintenance items as assigned
- Compare typical residential drawings with typical commercial drawings
- Determine ordering information for a thermostat sensor and associated wiring in a given commercial project, versus a given residential project
- Prepare an order for a replacement compressor for an air conditioner on a commercial building using plans, specifications, and submittals
- Prepare an order for a replacement compressor for an air conditioner on a residential project using plans, specifications, and submittals

2. **Interdisciplinary Application**
   Apply mathematical concepts and reasoning to solve problems in other academic disciplines.
   - Matching course component(s):

3. **Limitations of Mathematical Models**
   Recognize the limitations of mathematical models and methodologies in solving complex problems.
   - Matching course component(s):

BTS students must always be cognizant of the limitations of any single methodology in approaching their study and work. Because their study and practice will contribute to an environment humans will occupy, BTS students are taught explicitly to understand the limitations of mathematical models. As advanced as our technology has become it cannot yet completely predict how human behavior will impact complex systems like constructions sites and occupied buildings. BTS students are taught

quantitative reasoning well enough to use it to understand when it will be insufficient to solve a problem.

APSM 154C: HYDRONIC HEATING

- Describe the basics of a hydronic heating system
- Describe a basic hydronic heating system
- Explain the difference between a wet base and a dry base boiler
- Describe reasons for a hydronic heating system to have more than one zone
- Understand the different types of heat sources for hydronic heating (water, steam, geothermal/waste heat, solar)
- List four heat sources commonly used in hydronic heating systems
- Understand the basic components and operation of boilers
- State the reason a boiler is constructed in sections or tubes
- Discuss the reasons why air should be eliminated from hydronic heating systems (Lec and Lab)
- Explain the effect air has on a cast iron or steel boiler
- Describe the function of an air cushion or expansion tank
- Explain the operation of circulating pumps as they apply to hydronic heating systems (Lec and Lab)
- Describe the importance of "point of no pressure change"
- State the purpose of a pressure relief valve
- State the purpose of a zone valve
- Understand the different types of hydronic heating controls
- List the various types of zone valves that are available
- Explain how "outdoor reset" can be used to increase system efficiency

APSM 151A: SERVICE INTRODUCTION & SAFETY

- Understand construction safety to work safely
- Achieve EPA 608 certification
- Stratospheric ozone depletion
- Rules and regulations of the Clean Air Act
- Montreal Protocol
- Refrigerant recovery, recycling, and reclamation
- Recovery equipment and use
- Regulations regarding small appliances
- Regulations regarding high pressure appliances
- Regulations regarding low pressure appliances
- Understand the sheet metal trade overview (history and organization)
- History of the sheet metal trade
- Organization of the trade
- Job classification in the sheet metal trade
- SMWIA
- SMACNA

General Education Review Request
Area 2 - Mathematical Concepts & Quantitative Reasoning

4. **Critical Evaluation of Data**
   Assess the reliability, validity, and significance of data used in quantitative arguments.
   - Matching course component(s):

5. **Ethics in Quantitative Analysis**
   Evaluate the ethical implications of quantitative analysis and data presentation.
   - Matching course component(s):

Submit your completed form to your Division Curriculum Reps

Requesting Faculty: Robert Cormia Date: 5/15/25

Division Curriculum Rep: Tim Myres Date: 5/19/25

FOR USE BY CURRICULUM OFFICE:

Approved: ___ Denied: ____ CCC Co-Chair Signature: _____Date: _____

General Education Review Request
Area 2 - Mathematical Concepts & Quantitative Reasoning

Degree Program Addendum

If you are submitting a complete degree program (sequence of courses) to fulfill the requirements for this General Education Area, please provide a justification for why a sequence is being proposed instead of a single course. This justification must clearly demonstrate how the sequence, taken as a whole, meets the **Breadth** and **Depth** criteria outlined for this area.

The justification should also touch on how the sequence of courses:

Integrates learning outcomes (The sequence is designed as a cohesive program where learning outcomes are distributed across courses to achieve the required breadth and depth.)

and provides

Progressive development (The sequence builds skills or knowledge progressively, with later courses dependent on foundational learning established in earlier ones.)

Instructions for Mapping Degree Programs

1. Identify which courses in the sequence address specific **Mandatory Depth Outcomes** and **Optional Depth Outcomes**.
2. Provide a clear explanation of how each course contributes to fulfilling the **Breadth** criteria, noting any overlaps or unique contributions within the sequence.
3. Ensure the justification highlights the interdependence and integration of the courses within the sequence.

Example:
Course A introduces foundational concepts in literature and philosophy, addressing Depth Outcomes 1 and 3. Course B expands on these foundations through artistic and historical analysis, addressing Depth Outcomes 2, 4, and 5. Together, the sequence fulfills all mandatory outcomes and optional outcomes 1 and 3.

Your Response:

The Building Trade Service program is a holistic program of study for students in the air-conditioning mechanics apprenticeship program. The academic training students receive is not dispensed in the traditional model of a single course focused on a specific academic discipline; rather, the BTS sequence of courses introduces students early on to concepts and ideas that they then need to practice and refine as the sequence of courses continues across the five years of the program. Mandatory depth criteria referenced such as APSM 152C: introduction to electricity transitions into referenced courses such as APSM 154A: refrigeration in air conditioning, allowing students to interact with electrical parts, and hazardous chemicals such as refrigerant. This displays reasoning skills used to troubleshoot and maintain HVAC equipment. Optional depth criteria referenced such as APSM 151A: service introduction to safety, transitions into performing the necessary job functions of a service technician mapped as APSM 155C: maintaining efficient operation of electric cooling and heating equipment. Not

only do these skills transition into subsequent courses, but to the job functions of a service technician in field conditions.

Students in the BTS program begin learning quantitative reasoning in their first service introduction and safety class, but they are challenged to then deepen their understanding of these concepts and ideas in classes later in the program like Plans & Specifications for the Service Technician and Hydronic Systems, Pumps & Hydronic Balancing. Testing students' knowledge in new situations, including in on the job work performance is a feature of the apprenticeship program.

The BTS program applications reflect this approach both in breadth and depth. For example, the communications breadth standard is met throughout the program as students are required to write up their findings, give presentations to stakeholders and fellow students, and communicate in the language of the industry and the profession. This breadth requirement is further underscored by the depth requirements of the oral communication and critical thinking GE standards where students are taught to employ logic and consider audience when writing and presenting.

The BTS program is more than the sum of its parts. It reflects a more nuanced approach to teaching and learning, one that is constantly providing context and meaning for students as they are learning and progressing through the program, and one not easily untangled from the program as a whole. It may be more useful, then, to think of this program as one enormous classroom, a classroom in which all GE disciplines are happening all at once. If you trace snapshots of the curriculum over the five years, you will see the learning unfolding, but you don't get the whole picture from a single course in the program. These students aren't majoring in a program they are becoming its practitioners.

General Education Review Request
Area 4 - Social & Behavioral Sciences

Course Number & Title or Degree Program Name: Air Conditioning Mechanic Program
Indicate if this is: ☐ a course, or X a degree program

Overview:
Foothill College's General Education curriculum provides students with a well-rounded education, fostering critical thinking, communication, and interdisciplinary understanding. Faculty play a central role in ensuring GE courses align with these goals and prepare students for academic, professional, and civic success.

This form guides instructors in demonstrating how their course meets the learning outcomes for its designated GE area. Instructors should explain how their course develops analytical and communication skills, integrates diverse perspectives, and fosters interdisciplinary connections. Your contributions help maintain a rigorous and relevant GE curriculum that supports student achievement.

Breadth Criteria:
Foothill College's General Education curriculum equips students with broad and deep knowledge, preparing them to be independent thinkers and engaged members of a diverse society. GE courses encourage intellectual curiosity, interdisciplinary exploration, and critical engagement with the world.

Students gain exposure to a range of disciplines, including the arts, humanities, natural sciences, social sciences, and mathematics. This breadth fosters connections across fields and deepens understanding of cultural, social, and physical environments.

All GE courses emphasize critical analysis and ethical reasoning, challenging students to evaluate complex issues, articulate perspectives, and engage thoughtfully with diverse viewpoints. The curriculum also promotes equity, inclusion, and global awareness, ensuring students are prepared to contribute meaningfully to an interconnected world.

A completed GE pattern enables students to acquire, apply, and demonstrate competence in essential academic and professional competencies.

Depth Criteria for Area 4 - Social & Behavioral Sciences:
The Social and Behavioral Sciences encompass a wide range of interrelated disciplines that explore the complex relationships between individuals and societies. These fields investigate human behavior, social structures, cultural norms, and institutions, examining how these elements shape and are shaped by historical, economic, political, and environmental forces. The Social and Behavioral Sciences seek to provide students with a deeper understanding of the dynamics of human interaction and the diverse factors influencing societal development.

By analyzing patterns of human thought and action, this area fosters critical thinking and global awareness, equipping students to engage with pressing social issues in informed and meaningful ways. Students will explore topics such as identity, equity, governance, power, and cultural exchange, gaining tools to critically evaluate the challenges and opportunities facing societies today and in the future.

General Education Review Request
Area 4 - Social & Behavioral Sciences

Instructions for Mapping Course Components to Criteria

Please follow the steps below to demonstrate how your course (or degree program) fulfills the Breadth and Depth criteria for General Education Area 4 - Social & Behavioral Sciences. Use specific components from the Course Outline of Record (COR), such as course outcomes, expanded content, methods of instruction/evaluation, and/or lab content.

If mapping a degree program, please indicate from which course in the sequence you are sourcing COR components.

Breadth Mapping

For each of the following competencies, indicate if and how your course or degree program meets the requirement and provide corresponding course component(s) from the COR.

1. **Communication**
   Analytical reading, writing, speaking, and listening skills, including evaluation, synthesis, and research.
   - Matching course component(s):

Building Trade Services students utilize fundamental communication skills throughout their program to achieve their course outcomes. Students must interpret construction documents and specifications to evaluate whether the systems perform as designed. They produce formal documentation using charts and reports to present findings from mechanical testing. Students must synthesis information demonstrated by converting measurements to Total Dynamic Head, chart data, and synthesize this into reports that evaluate operational compliance. Interaction, both verbal and in listening, with team members is essential to make sure the performance data and operational sequences perform accurately.

APSM 177A, (Year 4 Semester 4, Modules 23-ALL, Mechanical Acceptance Testing) Students learn the requirements to attain a mechanical acceptance technician certification through the International Certification Bureau. Students engage in communication orally, diagrammatically, and in written documents to understand the functioning of a building's system to test proper equipment functioning. Once the system's functioning is evaluated and compared to construction documents, the Service technician then documents the readings in formalized charts and presents the material for official project documentation.

APSM 174A, (Year 4 Semester 2, Modules 21-3, Measuring Pump Performance Data and Pump Curves) Students demonstrate the process of measuring a pump's performance. This information is correlated to a pump curve which plots readings of pressure and converts the readings to Total Dynamic Head or pressure. This information is then categorized in chart form to verify the operating condition of a pump and back check this data against project documents and submittals.

Communication is used to gain access to performance data information, sequence of operations, and pump access.

2. **Computation**
   Application of mathematical concepts or principles of data collection and analysis to solve problems.
   - Matching course component(s):

Building Trade Service Students are applying both measurement techniques and mathematical conversions to collect, analyze, and interpret airflow data—using that analysis to solve operational problems in mechanical systems. They do this specifically by gathering raw pressure readings at multiple points within a duct system and converting the data into industry standard formulas. Students must use the data to solve problems such as inadequate fan performance, poor duct design, blockages, safety risks due to improper airflow, diagnosing balancing issues, and determining causes of poor performing equipment.

APSM 173C, (Year 3 Semester 1, Module 19-5, Performing a Duct Traverse) Students perform the functions of a duct traverse which collects readings of pressure in a duct system. The pressure readings are then converted using mathematical formulas to cubic feet per minute of airflow (CFM). This data is used to detect deficiencies within a system such as fan operating issues, duct system design issues, obstructions within a system, and life safety concerns.

APSM 173C, (Year 3 Semester 1, Module 19-4, Measure Airflow at Registers) Students perform the functions of measuring air using various tools within the industry such as flow hoods, rotating vane anemometers, and air data multi meters. These readings are taken in units of pressure and applied to formulas to be converted to readings of cubic feet per minute of air. This data is used to solve problems within a system such as balancing concerns, system design issues, and equipment failures.

3. **Critical Expression**
   Clearly and precisely express ideas in a logical and organized manner using discipline-appropriate language.
   - Matching course component(s):

Students in the Building Trade Service are taught the importance of clear and critical communication for health and safety. For example, students collect and interpret multiple data sources—including manufacturer specs, field measurements, and project drawings—to calculate the total energy impact of a system. This consistency and correctness are important for the efficiency of the system which will impact other systems.

APSM 178C, (Year 5 Semester 4, Module 29-2, Energy Audits and Utility Structures) Students learn the process of energy auditing as it relates to a mechanical system. Students interpret manufacturer data, project drawings and take measurements to calculate the total energy impact of a building's system.

General Education Review Request
Area 4 - Social & Behavioral Sciences

APSM 157A, (Year 3 Semester 2, Module 14-9, Types of Drawings and Their Components) Students learn to read and interpret construction drawings and identify components within a system's drawings. This process involves a demonstration of the ability to locate equipment and interpret the symbols, measurements, and notes within construction drawings.

4. **Community and Global Awareness**
   Consideration of one's role in society at local, national, and global levels in the context of cultural constructs and historical/contemporary issues.
   - Matching course component(s):

Students in the Building Trade Service program are learning how to provide universal safety and health standards that expand all localities and cultural groups. The coursework teaches a sense of civic and global responsibility in students by connecting their technical knowledge to historical events, societal needs, and the health and safety of communities worldwide. Students examine case studies of major fire and smoke events from around the world (e.g., high-rise fires, transportation hubs), exploring how these tragedies led to safety codes and design innovations**.** By studying these incidents and their aftermaths, students gain insight into how public expectations and regulatory bodies evolve based on cultural values, safety needs, and technological capabilities. Additionally, students study the evolution of IAQ measures—from basic filtration and water treatment to modern certification systems, showing how societal health concerns have shaped the mechanical trades over time.

APSM 180C, (Year 3 Semester 3, Module 17-4, Indoor Air Quality) Students learn the process of auditing a building's indoor air quality. The students engage in classroom discussion and hands on activities to achieve the indoor air quality certification through the International Certification Bureau.

APSM 174C, (Year 4 Semester 4, Module 24-11, Fire Smoke Damper Training) Students learn the historical data which governs current Fire Smoke Damper installation and design within a system. Current developments in smoke mitigation derived from catastrophic case studies, which have been compiled globally, and the codes which stemmed from these catastrophes have altered smoke control plans, and code cycles which govern building standards.

5. **Information and Digital Literacy**
   The set of integrated abilities that includes: the reflective discovery of information, the understanding of how information is produced and valued, the use of information in creating new knowledge, the ethical participation in communities of learning, and the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.
   - Matching course component(s):

Students in the Building Trade Service program are taught how to responsibly access and use technical data through digital tools to solve real-world system issues in an environmentally responsible and ethically sound manner. Students must assess what data is needed (e.g., system pressure, temperature, flow rates) to properly program automation systems and achieve design goals. Then they analyze the collected system data and apply it in configuring automated controls—ensuring efficient, responsive system performance under varying loads. Students engage with building automation

software**,** control interfaces, and digital instrumentation to actively program and adjust systems based on real-time feedback.

APSM 156A, (Year 2 Semester 1, Module 7-1, Heat Pumps) Service Apprentices learn how to evaluate submittal documents from vendors and confirm proper function of Heat Pumps in a system. Correct installation, functioning and maintenance is critical in reducing a building's energy and environmental impact. The service technician uses digital tools to take readings of pressure, and airflow to operating conditions and compare these conditions to submittal data.

APSM 181C, (Year 5 Semester 2, Module 26-3, Building Automation Controls and Advanced Technologies) Students perform the functions of programming an automated system to control components. The test records measurements of pressure, flow, and temperature used to correctly adapt and control a system to achieve a design standard.

Depth Mapping

<u>Mandatory</u> Depth Outcomes

Your course must address all the following outcomes. For each outcome, map the corresponding course component(s) from the COR.

1. **Interactions of People and Societies**
   Explain the interactions of people as members of societies, cultures, and social subgroups.
   - Matching course component(s):

Building Trade Service (BTS) students learn about the historical development of the union movement and union associations as representing labor organizations. Also, they learn the roles of various subgroups in the union movement and specifically about apprenticeship, the collective voice, and the interactions, the roles and responsibilities, of employers, contractors, and journey workers.

APSM 151A, (Year 1 Semester 1, Module 1-10, Intro to the Trade)

APSM 151A, (Year 1 Semester 1, Module 1-5, Discussion with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Representatives)

APSM 151A, (Year 1 Semester 1, Module 1-4, Discussion with Business Representatives)

APSM 151A, (Year 1 Semester 1, Module 1-10, Intro to the Trade)
The Union Heritage material focuses on interactions of people as members of societies, cultures and subgroups. Intro to the Trade covers the History of the BTS Local 104 in the Bay area and connects it to the history and importance of unions and the labor movement in general and how it has helped address discrimination against systemically oppressed people from lower, working-class, and Black, Indigenous, and People of Color (BIPOC) groups. Students learn applied examples of this, such as how

the Industrial Workers of the World (IWW) union wanted to abolish capitalism because of its systemic and negative effects on BIPOC people, women, children, and families.

APSM 151A, (Year 1 Semester 1, Module 1-5, Discussion with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Representatives) BTS apprentices analyze historical data and participate in classroom discussions on the topic of Local 104's role in Bay Area labor history. This discussion involves analysis of the labor movement in the bay area from the inception of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA). Some topics discussed are the Great Strike of 1934 and formation of the Sheet Metal Workers Union Hall and Training Center, which has now been designated a California State landmark.

APSM 151A, (Year 1 Semester 1, Module 1-4, Discussion with Business Representatives) Students learn about related businesses and jobsite practices, engage in discussion with business representatives, and are provided resources to ensure fair and ethical treatment on the jobsite is practiced by subgroups such as employees and employers.

2. **Critical Thinking and Multiple Perspectives**
   Exercise critical thinking and analytical oral and/or written skills, including consideration of events and ideas from multiple perspectives.
   - Matching course component(s):

BTS students exercise critical thinking and analytical oral and/or written skills including consideration of historical and current events and ideas from multiple perspectives such as of various subgroups in a wide-ranging apprenticeship process including the roles and responsibilities of employers, employee/contractors, coworkers, and journey workers, and governmental and overseeing agencies. This includes the consideration of unions and certification agencies that create, mandate, and update key building, health and safety, procedures, laws and/or codes through specific group activities, oral and written tasks, and work/ on the job experience.

APSM 156C, (BTS Year 2 Semester 2, Module 9-2, Operation, Maintenance, and Troubleshooting of Chilled Water Systems) Students learn critical thinking skills when, for example, they consider and troubleshoot issues related to applied examples like building sites' chilled water systems. This process involves an evaluation of current operating conditions of chilled water systems and back-checking data against construction related documents, submittal data, and building engineer records. In this process, documentation of any system changes is captured and submitted to building engineers for service maintenance data keeping.

APSM 152A, (BTS Year 1 Semester 2, Module 3-1, Basic Electricity) Students learn electrical theories that guide the process of troubleshooting components within a Heating, Ventilation, and Air Conditioning (HVAC) system. Students exercise critical thinking and analytical skills when learning about electrical Alternating Current (AC) and Direct Current (DC) theories and applying them by interacting with electrical components in an HVAC system to detect faults or failures in controls or wiring. This process may require coordination of verbal and written communications from electrical

subcontractors to understand winder data on specific operating conditions in various buildings, sites, and/or settings.

3. **Application of the Scientific Method**
   Demonstrate knowledge and application of the scientific method and other methods of inquiry relative to the discipline.
   - Matching course component(s):

BTS Apprenticeship students demonstrate knowledge and application of the scientific method relative to the discipline by conducting research such as troubleshooting HVAC systems, identifying the various uses of heating equipment, and defining and discussing the HVAC and refrigeration industry, including its processes, tools, equipment, and measurement devices.

APSM 152C, (BTS Year 1 Semester 2, Module 3-6, Calibrating Instruments) Throughout the apprenticeship, students replicate the scientific method as it relates to trouble shooting Heating, Ventilation and Air Conditioning (HVAC) systems. Part of this process is knowing the devices which are gathering data for analysis, are calibrated for accuracy. This class session involves a review of instrument calibration, and techniques for establishing calibration on digital devices using analog instruments.

APSM 174C, (BTS Year 4 Semester 4, Module 24-4, FSD, Wall Testing Maintenance and Repair) Students go through the process of the scientific method when analyzing and testing the functioning of fire dampers as they relate to a building's Smoke Egress Plan. Students learn proper functioning of a fire smoke damper and proper ways to troubleshoot and test the piece of equipment. This is further reviewed in project submittals and drawings on records attached to a building's smoke egress plan. If there are any defects in the equipment, the service technician must address the root cause of the issue to be repaired. BTS students learn how to document the process by creating, editing and refining accurate case notes documented in larger, official project documents.

4. **Understanding Power and Influence**
   Assess the distribution of power and influence within social, economic, and political systems.
   - Matching course component(s):

BTS Apprenticeship students assess the distribution of power and influence specifically in required Occupational Safety and Health Administration (OSHA) and California Occupational Safety and Health Administration (CAL/OSHA) training.

APSM 152A, (BTS Year 1 Semester 1, Module 1-9, ALL, Intro to OSHA) Students learn that safety is always a top priority, and a primary concern and that there are guidelines for addressing, documenting, reporting, and mitigating hazards in the construction industry. Injuries and illnesses often relate to power and influence, as most jobsite injuries are from a lack of planning or an established safety culture within a company. Students attain OSHA 30 qualification by addressing four focused hazards which cause most of the jobsite reporting. This helps students understand that,

regardless of their position or role, all workers—including themselves—are responsible for stopping work when a safety issue arises.

APSM 152C, (BTS Year 1 Semester 2, Module 3-3, OSHA Health and Safety Management) Students learn OSHA safety, health, and management systems. This course allows the student to analyze, from a company level, if a culture of safety has been established. The course encourages students to question policies and procedures at the company level and consider if OSHA guidelines for workplace safety are being followed. It also includes proper reporting procedures and how they are acknowledged and practiced at the company level.

5. **Engagement with Social Issues**
   Comprehend and engage in social, economic, and political issues at the local, national, and global levels.
   - Matching course component(s):

BTS Apprenticeship students comprehend and engage in social, economic, and political issues at the local, national, and global levels.

APSM 151A, (BTS Year 1 Semester 1, Module 1-4, Discussion with Business Representatives) Students engage in classroom discussion and outline the guidelines of the Collective Bargaining agreement of the Sheet Metal Workers. Students learn the proper procedures for documenting and reporting work hours and maintaining the integrity of the collective bargaining agreement throughout the apprenticeship. Students build a communication channel to the business representatives of the Local (#104) and establish points of contact for potential issues related to the collective bargaining agreement.

APSM 151A, (BTS Year 1 Semester 1, Module 1-5, Discussion with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) representatives) SMACNA is the international association for contractors in the Sheet Metal industry. Apprentices gain the knowledge of what SMACNA does as an organization globally, in terms of writing standards, providing workforce education, and representing contractors who are signatory to the Local union thereby connecting social, economic, and political issues at local, national and global levels. As students progress through the apprenticeship, knowledge of SMACNA standards become a governing force for designing, fabricating, and installing sheet metal finishes.

<u>Optional</u> Depth Outcomes

In addition to the mandatory outcomes, your course or sequence must address **at least two** of the following outcomes. For each selected outcome, map the corresponding course component(s).

1. **Diverse Cultures and Sensitivity**
   Demonstrate appreciation of and sensitivity toward diverse cultures, including their social, behavioral, and organizational structures.
   - Matching course component(s):

General Education Review Request
Area 4 - Social & Behavioral Sciences

BTS Apprenticeship Students demonstrate knowledge of, appreciation for, and sensitivity toward diverse cultures—particularly their social, behavioral, and organizational structures—through various means, including targeted training and activities focused on bias, belonging, and anti-harassment.

APSM 151A, (BTS Year 1 Semester 1, Module 1-2, Bias and Belonging) Students learn awareness of their own implicit bias as it relates to diverse cultures and inter-workplace relationships. Throughout the apprenticeship, students work with people of various backgrounds, education levels, cultural and other identities, and gain insight into communication techniques, and decision making in an ethical way. Students learn about inclusivity and diversity within minority groups and gain tools to address implicit biases.

2. **Global Development and Relationships**
   Explain world development and global relationships in historical and contemporary contexts.
   - Matching course component(s):

BTS Apprenticeship students explore global development and international relationships by examining energy efficiency standards across the world. The program curriculum integrates historical and contemporary examples of apprenticeship and skilled trades practices from diverse global contexts, fostering an understanding of our profound interconnectedness and the mutual learning that emerges from cross-cultural exchange.

APSM 180C, (BTS Year 3 Semester 4, Module 17-2, Heat Gains and Losses) Students learn to assess the effects of heat gains and losses in the context of determining appropriate mechanical equipment requirements for buildings. This process involves an understanding of the historical evolution of HVAC systems, which were often oversized to compensate for anticipated heat loss. Advancements in insulation technologies—applied to piping, ductwork, and building envelopes—now enable service technicians to more accurately diagnose areas of thermal inefficiency. This course highlights the global significance of these practices, as increasingly stringent energy efficiency standards and growing concerns about environmental degradation due to climate change drive the demand for more sustainable building solutions.

3. **Psychological and Social Dynamics**
   Explain the association between psychological well-being, mental processes, emotions, and societal functioning.
   - Matching course component(s):

4. **Historical and Ethical Contexts of Behavior**
   Analyze current events and global issues in the context of historic, ethical, and social patterns.
   - Matching course component(s):

BTS Apprenticeship students analyze current events and global issues in the context of historic, ethical, and social patterns.

General Education Review Request
Area 4 - Social & Behavioral Sciences

APSM 181B, (BTS Year 5 Semester 1, Module 25-2, Building Automation and Controls) Students analyze the progression of digital controlling strategies as it relates to a building's HVAC and life safety systems. Service technicians interact with control devices ranging from all developmental eras to service HVAC systems. Students develop knowledge of current and historical milestones of HVAC design and systems components and their interactions with and relationship to ethical issues. Students learn about the shifting future where more advanced HVAC systems use automatic controlling and include sensors which detect groupings of occupants in a space and modulate based on sensing data. As the world continues to heat up, the availability of new systems with technological advances is used as an example of historical, ethical, and social patterns.

5. **Human Behavior and the Natural World**
   Describe how individual interactions with the natural world and external societies shape and influence human behavior.
   - Matching course component(s):

BTS Apprenticeship students analyze the dynamic relationship between human behavior, the natural environment, and societal structures by examining case studies such as "sick building syndrome" and other real-world examples. These investigations highlight the critical role of building codes in promoting health and safety and illustrate how the inadequacy or absence of such regulations can contribute to public health crises and exacerbate social inequalities.

APSM 180C, (BTS Year 3 Semester 3, Module 17-4, Indoor Air Quality) Through integrated classroom discussions and experiential learning activities, students develop the skills necessary to audit indoor air quality in buildings, with the objective of obtaining "Indoor Air Quality" certification through the International Certification Bureau. Exposure to poor indoor air quality has been shown to adversely affect human health and cognitive performance, often manifesting as symptoms associated with "sick building syndrome." These symptoms, linked to diminished brain function, are frequently the result of insufficient ventilation and the presence of airborne pollutants. The issue first gained widespread attention in the educational sector, where deteriorating air quality was correlated with decreased academic performance among students.

Submit your completed form to your Division Curriculum Reps

Requesting Faculty: PATRICIA GIBBS Date: MAY 14, 2025

Division Curriculum Rep: Tim Myres Date: 5/19/25

FOR USE BY CURRICULUM OFFICE:

Approved: ___ Denied: ____ CCC Co-Chair Signature: _____ Date: _____

General Education Review Request
Area 4 - Social & Behavioral Sciences

Degree Program Addendum

If you are submitting a complete degree program (sequence of courses) to fulfill the requirements for this General Education Area, please provide a justification for why a sequence is being proposed instead of a single course. This justification must clearly demonstrate how the sequence, taken as a whole, meets the **Breadth** and **Depth** criteria outlined for this area.

The justification should also touch on how the sequence of courses:

Integrates learning outcomes (The sequence is designed as a cohesive program where learning outcomes are distributed across courses to achieve the required breadth and depth.)

and provides

Progressive development (The sequence builds skills or knowledge progressively, with later courses dependent on foundational learning established in earlier ones.)

Instructions for Mapping Degree Programs

1. Identify which courses in the sequence address specific **Mandatory Depth Outcomes** and **Optional Depth Outcomes**.
2. Provide a clear explanation of how each course contributes to fulfilling the **Breadth** criteria, noting any overlaps or unique contributions within the sequence.
3. Ensure the justification highlights the interdependence and integration of the courses within the sequence.

Example:
Course A introduces foundational concepts in literature and philosophy, addressing Depth Outcomes 1 and 3. Course B expands on these foundations through artistic and historical analysis, addressing Depth Outcomes 2, 4, and 5. Together, the sequence fulfills all mandatory outcomes and optional outcomes 1 and 3.

Your Response:

The Building Trade Service program is a holistic program of study for students in the air-conditioning mechanics apprenticeship program. The academic training students receive is not dispensed in the traditional model of a single course focused on a specific academic discipline; rather, the BTS sequence of courses introduces students early on to concepts and ideas that they then need to practice and refine as the sequence of courses continues across the five years of the program. From the start of the BTS program, students learn the social, economic, and political relationships of the Local 104 Union, and the contractors which are signatory to the collective bargaining agreement. This is referenced in the mandatory depth criteria as APSM 151A, (BTS Year 1 Semester 1, Module 1-4, Discussion with Business Representatives) transitioning into APSM 151A, (BTS Year 1 Semester 1, Module 1-5, Discussion with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) representatives). Within the first year of the BTS program, students learn the importance of calibrated instruments used to gather readings to perform trouble shooting of an HVAC system for the goal of

achieving design efficiency. This is referenced in the mandatory depth criteria as APSM 152C, (BTS Year 1 Semester 2, Module 3-6, Calibrating Instruments) and ties into subsequent optional depth references such as APSM 181B, (BTS Year 5 Semester 1, Module 25-2, Building Automation and Controls). BTS students learn how an HVAC system impacts the environment and the world which we live in, with classes referenced such as APSM 156C, (BTS Year 2 Semester 2, Module 9-2, Operation, Maintenance, and Troubleshooting of Chilled Water Systems) relating to optional depth criteria referenced such as APSM 180C, (BTS Year 3 Semester 3, Module 17-4, Indoor Air Quality) and many others throughout the program.

Students in the BTS program begin learning quantitative reasoning in their first service introduction and safety class, but they are challenged to then deepen their understanding of these concepts and ideas in classes later in the program like Plans & Specifications for the Service Technician and Hydronic Systems, Pumps & Hydronic Balancing. Testing students' knowledge in new situations, including in on the job work performance is a feature of the apprenticeship program.

The BTS program applications reflect this approach both in breadth and depth. For example, the communications breadth standard is met throughout the program as students are required to write up their findings, give presentations to stakeholders and fellow students, and communicate in the language of the industry and the profession. This breadth requirement is further underscored by the depth requirements of the oral communication and critical thinking GE standards where students are taught to employ logic and consider audience when writing and presenting.

The BTS program is more than the sum of its parts. It reflects a more nuanced approach to teaching and learning, one that is constantly providing context and meaning for students as they are learning and progressing through the program, and one not easily untangled from the program as a whole. It may be more useful, then, to think of this program as one enormous classroom, a classroom in which all GE disciplines are happening all at once. If you trace snapshots of the curriculum over the five years, you will see the learning unfolding, but you don't get the whole picture from a single course in the program. These students aren't majoring in a program they are becoming its practitioners.

General Education Review Request
Area 5 - Natural Sciences (with Lab)

Course Number & Title or Degree Program Name: Air Conditioning Mechanic Program
Indicate if this is: ☐ a course, or X a degree program

Overview:
Foothill College's General Education curriculum provides students with a well-rounded education, fostering critical thinking, communication, and interdisciplinary understanding. Faculty play a central role in ensuring GE courses align with these goals and prepare students for academic, professional, and civic success.

This form guides instructors in demonstrating how their course meets the learning outcomes for its designated GE area. Instructors should explain how their course develops analytical and communication skills, integrates diverse perspectives, and fosters interdisciplinary connections. Your contributions help maintain a rigorous and relevant GE curriculum that supports student achievement.

Breadth Criteria:
Foothill College's General Education curriculum equips students with broad and deep knowledge, preparing them to be independent thinkers and engaged members of a diverse society. GE courses encourage intellectual curiosity, interdisciplinary exploration, and critical engagement with the world.

Students gain exposure to a range of disciplines, including the arts, humanities, natural sciences, social sciences, and mathematics. This breadth fosters connections across fields and deepens understanding of cultural, social, and physical environments.

All GE courses emphasize critical analysis and ethical reasoning, challenging students to evaluate complex issues, articulate perspectives, and engage thoughtfully with diverse viewpoints. The curriculum also promotes equity, inclusion, and global awareness, ensuring students are prepared to contribute meaningfully to an interconnected world.

A completed GE pattern enables students to acquire, apply, and demonstrate competence in essential academic and professional competencies.

Depth Criteria for Area 5 - Natural Sciences (with Lab):
Natural Sciences courses focus on exploring the physical universe, its life forms, and the measurable natural phenomena that govern its operations. These courses emphasize the scientific method as a means of discovery and understanding, fostering critical thinking, data analysis, and an appreciation of the interconnectedness between science and human activity.

Laboratory components complement lectures by providing hands-on experiences where students directly interact with the material world, utilize scientific tools, and apply theoretical concepts to real-world scenarios. Together, lecture and lab experiences promote a comprehensive understanding of scientific principles, preparing students to analyze complex systems and contribute to solving pressing scientific and societal challenges.

General Education Review Request
Area 5 - Natural Sciences (with Lab)

Instructions for Mapping Course Components to Criteria

Please follow the steps below to demonstrate how your course (or degree program) fulfills the Breadth and Depth criteria for General Education Area 5 - Natural Sciences (with Lab). Use specific components from the Course Outline of Record (COR), such as course outcomes, expanded content, methods of instruction/evaluation, and/or lab content.

If mapping a degree program, please indicate from which course in the sequence you are sourcing COR components.

Breadth Mapping

For each of the following competencies, indicate if and how your course or degree program meets the requirement and provide corresponding course component(s) from the COR.

1. **Communication**
   Analytical reading, writing, speaking, and listening skills, including evaluation, synthesis, and research.
   - Matching course component(s):

Building Trade Services students utilize fundamental communication skills throughout their program to achieve their course outcomes. Students must interpret construction documents and specifications to evaluate whether the systems perform as designed. They produce formal documentation using charts and reports to present findings from mechanical testing. Students must synthesis information demonstrated by converting measurements to Total Dynamic Head, chart data, and synthesize this into reports that evaluate operational compliance. Interaction, both verbal and in listening, with team members is essential to make sure the performance data and operational sequences perform accurately.

APSM 177A, (Year 4 Semester 4, Modules 23-ALL, Mechanical Acceptance Testing) Students learn the requirements to attain a mechanical acceptance technician certification through the International Certification Bureau. Students engage in communication orally, diagrammatically, and in written documents to understand the functioning of a building's system in order to test proper equipment functioning. Once the system's functioning is evaluated and compared to construction documents, the Service technician then documents the readings in formalized charts and presents the material for official project documentation.

APSM 174A, (Year 4 Semester 2, Modules 21-3, Measuring Pump Performance Data and Pump Curves) Students demonstrate the process of measuring a pump's performance. This information is correlated to a pump curve which plots readings of pressure and converts the readings to Todal Dynamic Head or pressure. This information is then categorized in chart form to verify the operating condition of a pump and back check this data against project documents and submittals.

Communication is used to gain access to performance data information, sequence of operations, and pump access.

2. **Computation**
   Application of mathematical concepts or principles of data collection and analysis to solve problems.
   - Matching course component(s):

Building Trade Service Students are applying both measurement techniques and mathematical conversions to collect, analyze, and interpret airflow data—using that analysis to solve operational problems in mechanical systems. They do this specifically gathering raw pressure readings at multiple points within a duct system and converting the data into industry standard formulas. Students must use the data to solve problems such as inadequate fan performance, poor duct design, blockages, safety risks due to improper airflow, diagnose balancing issues and in determining causes for poor performing equipment.

APSM 173C, (Year 3 Semester 1, Module 19-5, Performing a Duct Traverse) Students perform the functions of a duct traverse which collects readings of pressure in a duct system. The pressure readings are then converted using mathematical formulas to cubic feet per minute of airflow (CFM). This data is used to detect deficiencies within a system such as fan operating issues, duct system design issues, obstructions within a system, and life safety concerns.

APSM 173C, (Year 3 Semester 1, Module 19-4, Measure Airflow at Registers) Students perform the functions of measuring air using various tools within the industry such as flow hoods, rotating vane anemometers, and air data multi meters. These readings are taken in units of pressure and applied to formulas to be converted to readings of cubic feet per minute of air. This data is used to solve problems within a system such as balancing concerns, system design issues, and equipment failures.

3. **Critical Expression**
   Clearly and precisely express ideas in a logical and organized manner using discipline-appropriate language.
   - Matching course component(s):

Students in the Building Trade Service are taught the importance of clear and critical communication for health and safety. For example, students collect and interpret multiple data sources—including manufacturer specs, field measurements, and project drawings—to calculate the total energy impact of a system. This consistency and correctness are important for the efficiency of the system which will impact other systems.

APSM 178C, (Year 5 Semester 4, Module 29-2, Energy Audits and Utility Structures) Students learn the process of energy auditing as it relates to a mechanical system. Students interpret manufacturer data, project drawings and take measurements to calculate the total energy impact of a building's system.

General Education Review Request
Area 5 - Natural Sciences (with Lab)

APSM 157A, (Year 3 Semester 2, Module 14-9, Types of Drawings and Their Components) Students learn to read and interpret construction drawings and identify components within a system's drawings. This process involves a demonstration of the ability to locate equipment and interpret the symbols, measurements, and notes within construction drawings.

4. **Community and Global Awareness**
   Consideration of one's role in society at local, national, and global levels in the context of cultural constructs and historical/contemporary issues.
   - Matching course component(s):

Students in the Building Trade Service program are learning how to provide universal safety and health standards that expand all localities and cultural groups. The coursework teaches a sense of civic and global responsibility in students by connecting their technical knowledge to historical events, societal needs, and the health and safety of communities worldwide. Students examine case studies of major fire and smoke events from around the world (e.g., high-rise fires, transportation hubs), exploring how these tragedies led to safety codes and design innovations**.** By studying these incidents and their aftermaths, students gain insight into how public expectations and regulatory bodies evolve based on cultural values, safety needs, and technological capabilities. Additionally, students study the evolution of IAQ measures—from basic filtration and water treatment to modern certification systems, showing how societal health concerns have shaped the mechanical trades over time.

APSM 180C, (Year 3 Semester 3, Module 17-4, Indoor Air Quality) Students learn the process of auditing a building's indoor air quality. The students engage in classroom discussion and hands on activities to achieve the indoor air quality certification through the International Certification Bureau.

APSM 174C, (Year 4 Semester 4, Module 24-11, Fire Smoke Damper Training) Students learn the historical data which governs current Fire Smoke Damper installation and design within a system. Current developments in smoke mitigation derived from catastrophic case studies, which have been compiled globally, and the codes which stemmed from these catastrophes have altered smoke control plans, and code cycles which govern building standards.

5. **Information and Digital Literacy**
   The set of integrated abilities that includes: the reflective discovery of information, the understanding of how information is produced and valued, the use of information in creating new knowledge, the ethical participation in communities of learning, and the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.
   - Matching course component(s):

Students in the Building Trade Service program are taught how to responsibly access and use technical data through digital tools to solve real-world system issues in an environmentally responsible and ethically sound manner. Students must assess what data is needed (e.g., system pressure, temperature, flow rates) to properly program automation systems and achieve design goals. Then they analyze the collected system data and apply it in configuring automated controls—ensuring efficient, responsive system performance under varying loads. Students engage with building automation

software**,** control interfaces, and digital instrumentation to actively program and adjust systems based on real-time feedback.

APSM 156A, (Year 2 Semester 1, Module 7-1, Heat Pumps) Service Apprentices learn how to evaluate submittal documents from vendors and confirm proper function of Heat Pumps in a system. Correct installation, functioning and maintenance is critical in reducing a building's energy and environmental impact. The service technician uses digital tools to take readings of pressure, and airflow to operating conditions and compare these conditions to submittal data.

APSM 181C, (Year 5 Semester 2, Module 26-3, Building Automation Controls and Advanced Technologies) Students perform the functions of programming an automated system to control components. The test records measurements of pressure, flow, and temperature used to correctly adapt and control a system to achieve a design standard.

Depth Mapping

<u>Mandatory</u> Depth Outcomes (Lecture)

Your course must address all the following outcomes. For each outcome, map the corresponding course component(s) from the COR.

1. **Scientific Method**
   Develop an understanding of the scientific method, including its attributes and limitations.
   - Matching course component(s):

The scientific method is deeply embedded in the BTS curriculum. Apprentices apply it routinely in troubleshooting, performance validation, and system optimization. They form hypotheses based on performance anomalies, test these hypotheses using empirical data, and adjust their conclusions considering results. This mirrors a classical iterative approach to inquiry used in scientific labs.

APSM 152A, (Year 1 Semester 1, Module 2-5, Installation, System Charging) Students learn the functioning of an HVAC system and understand the systematic process of diagnosing and testing issues in the system. Principles of hydronic movement, thermodynamics, and pressure are tested and quantified in order to fix deficiencies in equipment and systems.

APSM 152A, (Year 1 Semester 1, Module 1-5, OSHA Electrical Hazards) Students learn the hazards associated with electrical systems tied to an HVAC system. Understanding the functioning and safety of electrical components guides the service apprentice in all the work related to the system.

2. **Judging Evidence**
   Build the ability to evaluate the validity of scientific evidence.
   - Matching course component(s):

General Education Review Request
Area 5 - Natural Sciences (with Lab)

Students are required to assess the reliability, accuracy, and context of data—skills fundamental to evaluating scientific evidence. In applications, this means determining whether data from airflow or pressure sensors is valid, understanding margin-of-error in system specs, and adjusting or disregarding outlier data due to confounding conditions.

APSM 153B, (Year 1 Semester 2, Module 4-3, Troubleshooting Electric Motors) Students learn the process of testing electric motors against manufacturer data and project specifications to achieve design criteria. The process of trouble shooting motors, involves known scientific data of airflow and pressure movement and utilizes tools and equipment such as rotating vane anemometers and air multimeters.

APSM 153B, (Year 1 Semester 2, Module 4-2, Motor Controls). Student learn the process and functioning of motor controls which are used to power and drive an HVAC system. Known concepts of electrical theory, and program sequencing are utilized to test and verify functioning of HVAC equipment which includes motors. Evidence is gathered using existing conditions of motor RPM's and testing how motor functioning correlates with airflow calculations.

3. **Scientific Concepts**
   Foster an understanding of the relationship between hypothesis, experiment, fact, theory, and law.
   - Matching course component(s):

Students are trained in fundamental scientific principles such as thermodynamics, heat transfer, fluid mechanics, and gas laws. These are not just theoretical—they're applied in system diagnostics, energy efficiency optimization, and safety protocols.

The curriculum teaches scientific laws like Boyle's Law, Charles's Law, and Dalton's Law in contexts, for example, analyzing refrigerant behavior under varying pressures and temperatures. Labs like Heat, Temperature, and Pressure (Unit 1) and Indoor Air Quality (Unit 34) bridge textbook knowledge with real-world applications.

APSM 174C, (Year 4 Semester 4, Module 24-11, Fire Smoke Damper Training) Students learn the relationship of hypothesis, experiment, fact, theory and law when it comes to troubleshooting and analyzing designs of buildings. This process is seen throughout the program but Fire Smoke Damper testing is taking theories of smoke control plans, and testing actual installations against these theories. In this testing there are known concepts of pressure movement and heat transfer.

APSM 177A, (Year 4 Semester 4, Modules 23-ALL, Mechanical Acceptance Testing) Students learn the requirements to attain a mechanical acceptance technician certification through the International Certification Bureau. This certification outlines the procedures for testing designs, and confirming the functioning of equipment to a mechanical design.

4. **Reasoning Skills**
   Cultivate the ability to use inductive, deductive, and model-based reasoning to solve problems.

- Matching course component(s):

The curriculum distinguishes itself by emphasizing both inductive and deductive reasoning. Students must use logic to determine likely causes of system failure, evaluate multiple diagnostic paths, and resolve performance issues based on limited clues. This mirrors how scientists use pattern recognition and formal logic to interpret results.

For example, students learning about Building Automation Controls are trained to interpret sensor outputs and actuator behaviors, and trace faults back to either mechanical or logical control failures. The process of narrowing down from broad system behavior to specific control faults is inherently deductive.

Students learn how to identify and use tools which fit best applications of an HVAC system. Tools range from powered tools, hand tools, and scientific instruments to measure air and hydronic movement in a system.

APSM 152C, (Year 1 Semester 2, Module 3-5, Tools and Equipment) Students learn through hands on demonstrations and class discussion, the tools related to the building trades service industry. These tools allow the service apprentice to take readings of electrical, air, and hydronic movement. Selecting the best tool for the job involves a deductive reasoning process analyzing safety concerns, and design constraints to document critical readings.

APSM 181C, (Year 5 Semester 1, Module 26-2, Building Automation System Installation) Students learn the functions of a DDC control system as it relates to controlling an HVAC system. Students then take components of a system such as actuators, valves, and dampers, and program an automated system to control and operate the functioning of the devices. In this practice students understand wiring schematics, manufacturer information and test their theories for how to properly wire and control the devices.

5. **Critical Thinking**
   Encourage the practice of critical thinking, including evaluating ideas, contrasting opinions, and drawing reasoned conclusions.
   - Matching course component(s):

Critical thinking is taught explicitly in professional development modules and is embedded throughout technical lessons. Students are asked to evaluate competing system configurations, determine trade-offs in energy efficiency, and even reflect on jobsite decisions. The curriculum fosters a mindset where apprentices are empowered to question assumptions, assess constraints, and propose solutions.

The Human Relations and Professional Development modules train students to critically evaluate both technical performance and human systems. Apprentices also critique their own work and assess peer performance based on jobsite simulations.

General Education Review Request
Area 5 - Natural Sciences (with Lab)

Building trades service apprentices have to evaluate design parameters in order to address proper system functioning. These design ideas are then tested, and any deficiencies are noted and fixed by the apprentice.

APSM 174A, (Year 4 Semester 3, Module 21-8, Pumps and Pump Laws) Students learn the process for measuring pressure across various different pumps and components tied to the hydronic system. This process involves an analysis of contrasting opinions to isolate issues in an HVAC system and to take measurements at points in a system actually related to the symptoms of the issue experienced.

APSM 173B, (Year 4 Semester 2, Module 20-3, Measure Minimum Ventilation Rates) Students learn to evaluate design ventilation rates, and verify if actual measurements ensure the proper functioning of HVAC system components. Spaces are designed for occupant's use criteria, and often repurposed spaces change designations.

<u>Optional</u> Depth Outcomes (Lecture)

In addition to the mandatory outcomes, your course or sequence must address **at least two** of the following outcomes. For each selected outcome, map the corresponding course component(s).

1. **Appreciation of Science in Modern Life**
   Develop an appreciation of the contributions of science to modern life.
   - Matching course component(s):

In the BTS apprenticeship program, students gain a deep appreciation for how scientific advancements translate into real-world applications that enhance building safety and performance. The program emphasizes understanding a building or project wholistically and apply diagnostic strategies analogous to medicine; indeed, buildings can sometime be referred to as "sick." Students in the BTS program are taught to understand not only their role in modern construction and maintenance projects, but also how those projects are responsive to modern needs like climate change.

APSM 156A, (Year 2 Semester 1, Module 7-1, Heat Pumps) Students learn the proper functioning of heat pumps, and learn how to service and maintain the equipment. Heat pumps have contributed to modern HVAC designs and are considered to be the future of energy efficiency for residential markets. The Building Trades Service Apprentice training has been recognized by the Department of Energy for leading the way in energy efficient practices.

APSM 158A, (Year 2 Semester 3, Module 11-4 Advanced Automatic Controls) Students learn the process of testing and installing automatic controls in an HVAC system. A system designed with automatic controls utilizes advancements in sensors, and automatic controlling of dampers, and actuators on the air and hydronic side for the end goal of creating an energy efficient system.

2. **Diversity in Science**
   Recognize contributions to science by diverse people and cultures.
   - Matching course component(s):

General Education Review Request
Area 5 - Natural Sciences (with Lab)

3. **Human-Environment Interdependence**
   Understand the interdependence of humans and their environment.
   - Matching course component(s):

The BTS apprenticeship curriculum emphasizes environmental stewardship and protection through rigorous EPA training and EPA608 refrigerant evacuation certification. Students are prepared for certification on how to safely handle refrigerants and prevent environmental harm. This training reinforces the idea that human activity (e.g., leaking refrigerants) has direct impacts on atmospheric chemistry and climate.

Moreover, in Personal Protective Equipment (PPE) Training, students explore how jobsite hazards and environmental exposures require proactive behavior and technological interventions to protect human health.

APSM 152A, (Year 1 Semester 1, Module 1-9, ALL, Intro to OSHA) Students learn the guidelines for addressing, documenting, reporting, and mitigating hazards in the construction industry. Students attain an OSHA 30 qualification by addressing the focus four hazards which cause the majority of jobsite reporting's. The students demonstrate awareness of OSHA standards on a jobsite by wearing personal protective equipment for jobsite hazards.

APSM 151A, (Year 1 Semester 1, Module 1-6, EPA 608) Students study the clean air act which has dictated the required certifications for technicians who handle refrigerant evacuation. The study of the impacts HVAC has to the environment, shape the culture of construction and service work when dealing with potentially hazardous waste products. Students in the first year of training go through the steps to attain the certification through the Environmental Protection Agency, and therefor are certified to work on refrigerant systems throughout their careers.

4. **Impact of Human Behavior**
   Recognize how human behavior has altered the environment.
   - Matching course component(s):

The BTS program fosters this recognition through modules on Indoor Air Quality and EPA refrigerant management. Students study how poor building ventilation, inappropriate material choices, and improper refrigerant handling can degrade both indoor and outdoor environments. They are taught to use monitoring tools, adjust performance, and prevent harmful emissions—all practices that directly mitigate human-caused environmental harm.

This training also introduces data on cognitive performance in poorly ventilated environments, tying human health outcomes to engineering design decisions.

The training also discusses methods of heating and cooling utilizing existing environmental conditions and conserving energy. Geothermal heating, and utilizing outside air for temperature control, are tested in both laboratory and classroom settings.

APSM 180C, (Year 3 Semester 3, Module 17-4, Indoor Air Quality) Students learn the process of auditing a building's indoor air quality. The students engage in classroom discussion and hands on activities to achieve the indoor air quality certification through the International Certification Bureau. Effects of poor indoor air quality are a global environmental concern. This class explores the history of improving indoor air quality with filtration, water treatment, and equipment used to protect building occupants from exposure.

APSM 156A, (Year 2 Semester 1, Module 7-6, Geothermal Heat Pumps) Students learn the components and trouble shooting of a geothermal heat pump system. Geo thermal energy uses environmental conditions to provide heating with limited additional heat sources. The students engage in lab activities and work directly with the components of this system.

5. **History of Science**
   Explore the history of science, including the ideas and experiments that have shaped the scientific method.
   - Matching course component(s):

<u>Mandatory</u> Depth Outcomes (Lab)

Laboratory components must align with the following definition of laboratory experience (adapted from the National Research Council (2005):

Laboratory experiences provide opportunities for students to interact directly with the material world (or with data drawn from the material world), using the tools, data collection techniques, models, and theories of science. This definition includes student interaction with astronomical databases, genome databases, databases of climatic events over long time periods, and other large data sets derived directly from the material world. It does not exclusively include student manipulation or analysis of data created by a teacher to simulate direct interaction with the material world.

Your course must address all the following outcomes. For each outcome, map the corresponding course component(s) from the COR.

1. **Direct Interaction**
   Engage in observation and data collection through direct interaction with the material world.
   - Matching course component(s):

Students measure airflow using tools such as anemometers, flow hoods, and multimeters then apply these readings in mathematical equations to calculate CFM (cubic feet per minute) or GPM (Gallons per minute). They balance hydronic systems and air systems by manually adjusting valves and pumps

to reach design-specified flow rates. These exercises involve direct engagement with mechanical systems and instrumentation.

APSM 158A, (Year 2 Semester 3, Module 11-7.1, Controlling Temperature) Students learn about the methods and practices to control the temperature in spaces. This involves an understanding of the BTU, thermal dynamics, manufacturer data, system controlling, pressure movements, and the refrigeration cycle. Building trades service apprentices understand these concepts when performing trouble shooting in various environmental conditions with hands on laboratory activities.

APSM 158A, (Year 2 Semester 3, Module 11-7.2, Pressure Sensing Devices) Students work with dry nitrogen as a substitute for a refrigerant. The students interact with pressure sensing devices, and manipulate actuators and valves of an HVAC system based on direct pressure readings. Students then use ohmmeters to monitor electrical power throughout the system.

2. **Scientific Tools and Techniques**
   Use tools, data collection techniques, models and model-based reasoning, and theories consistent with those employed in research laboratories.
   - Matching course component(s):

From anemometers and flow hoods to pitot tubes and pressure gauges, apprentices master the tools essential for diagnostics. The curriculum emphasizes not just usage but also calibration, maintenance, and the interpretation of data from these instruments. Students simulate performance assessments akin to laboratory environments.

APSM 173C, (Year 3 Semester 1, Module 19-8, Instruments of the TAB Industry) Students learn the tools of testing adjusting and balancing an HVAC system. An in depth understanding of tools such as psychrometers, voltmeters, flow hoods, manometers, multimeters, and rotating vane anemometers is necessary to performing the troubleshooting tasks of a service technician. These devices measure airflow, waterflow, pressures, electrical energy, and other scientific principles.

APSM 173C, (Year 3 Semester 1, Module 19-11, Air Pressure and Measurements) Students use air data multimeters, flow hoods, rotating vane anemometers, and pitot tubes to attain airflow measurements at outlets of an HVAC system. These readings are often taken in Feet per minute, and students calculate this as it relates to Cubic Feet per minute of airflow or CFM.

3. **Data Analysis with Authentic Data Sets**
   Work with data derived directly from the material world (e.g., large data sets such as astronomical, genome, and climate databases) and avoid exclusive reliance on teacher-created data.
   - Matching course component(s):

Students throughout the program compare manufacturer-submitted data (submittals) with real operational measurements from systems. This introduces the challenge of analyzing live systems,

identifying anomalies, and validating assumptions about system performance. The tasks simulate engineering-level quality assurance.

APSM 174B, (Year 3 Semester 4, Module 22-5, TAB Technician Review Water) Students perform the functions of balancing a hydronic system attached to an HVAC system. Data is collected from construction plans, specifications, sequence of operations, electrical diagrams, and psychometrics charts to verify the current status of the hydronic loop. Students interact with the data and achieve a basis of design as controlled by the instructor or test proctor.

APSM 174B, (Year 3 Semester 4, Module 22-5, TAB Technician Review Air) Students perform the function of balancing airflow in an HVAC system. Students collect information from project drawings, specifications, manufacturer data and perform tests on an existing HVAC system's performance. Data is collected with airflow readings and compared to data sets for the project. Students then balance the system's airflow with controlling dampers and system equipment.

4. **Hypothesis Testing**
   Formulate and test hypotheses using recognized scientific methodologies.
   - Matching course component(s):

Students in the BTS program test hypotheses and troubleshoot systemically, sometimes using integrative predictive modeling. For example, if airflow is uneven, students might hypothesize a closed damper, then test it using DDC controls. The cycle of problem prediction, intervention, and measurement replicates formal scientific procedure.

APSM 153B, (Year 1 Semester 2, Module 4-3, Troubleshooting Electric Motors) Students learn the process of testing electric motors against manufacturer data and project specifications to achieve design criteria. The process of trouble shooting motors, involves known scientific data of mechanical movements, belt tensions, and optimal system functioning. When testing motors, students interact with scientific instruments to take active measurements, while applying knowledge of safety and OSHA compliance.

APSM 152A, (Year 1 Semester 1, Module 2-4, Leak Detection) Students understand the parts and components of an HVAC piping system and undergo leak tests to determine system loss. All systems over time experience leaks, and a service technician has to isolate the condition and repair if needed. These leaks can range from almost immeasurable to significant.

5. **Communication & Collaboration**
   Communicate findings effectively through oral and/or written work independently and as a member of a team.
   - Matching course component(s):

Communication is central in the service program, where apprentices produce formal audit documents, written reports, and oral presentations. Collaboration is emphasized through team-based labs like refrigerant charging or balancing, where division of labor and mutual understanding are required for safety and success.

General Education Review Request
Area 5 - Natural Sciences (with Lab)

APSM 157A, (Year 3 Semester 2, Module 14-7, A closer Look at Plans) Students learn to read and interpret construction project drawings. These drawings range from structural, electrical, mechanical, architectural, and civil drawings. A knowledge of plans is a building block to being able to communicate and identify points of interest as it relates to a mechanical system. Plans are used as communication tools from engineering departments, manufacturers of HVAC equipment to convey information which is vital for the construction process.

APSM 173C, (Year 3 Semester 1, Module 19-5 Performing a Duct Traverse) Students work in groups and perform the functions of a Pitot tube traverse. This project allows students to take active airflow readings in groups. The groups work together to correctly identify points to take readings, perform a pitot traverse, and then document the necessary readings of air movement to balance the airflow of a system in official commissioning documentation format.

<u>Optional</u> Depth Outcomes (Lab)

In addition to the mandatory outcomes, your course or sequence must address **at least two** of the following outcomes. For each selected outcome, map the corresponding course component(s).

1. **Experimental Records**
   Maintain accurate and complete experimental records.
   - Matching course component(s):

Accurate and complete experimental records are essential for replicating scientific procedures and ensuring data integrity. In the context of the Natural Sciences lab, students are expected to maintain detailed logs of procedures, measurements, and observations. These records not only serve as a reference for future work but also train students in documentation practices used in real-world scientific and technical settings such as laboratory research or system diagnostics.

Good record-keeping promotes accountability, allows peer verification, and forms the foundation of quality assurance in both academic and industry labs. Whether students are calibrating instruments, conducting tests, or verifying results, thorough documentation is key to credibility and success.

APSM 181C, (Year 5 Semester 2, Module 26-3, Building Automation Controls and Advanced Technologies) Students perform the functions of programming an automated system to control HVAC components. The test records for measurements of pressure, flow, and temperature are used to correctly adapt and control a system to achieve a design standard.

APSM 181B, (Year 5 Semester 1, Module 25-3, Operator Interfaces) Students learn the functions of systems automatic alarms, and the necessary documentation of these conditions. Automatic alarms in a system prevent system failures, as well as potential health and safety concerns. Components tied to these alarm systems have to be confirmed to function per manufacturer data and positioned in a system to properly alarm in system failures.

General Education Review Request
Area 5 - Natural Sciences (with Lab)

2. **Quantitative and Qualitative Measurements**
   Perform accurate quantitative and qualitative measurements.
   - Matching course component(s)

Service students use both quantitative and qualitative measurements during their work to evaluate, diagnose, and optimize heating, ventilation, and air conditioning systems. Both measurement types are essential: Quantitative data is paramount in documenting precise readings for the effort of official documentation, while qualitative observations guide diagnostics and troubleshooting. HVAC technicians are trained to use both in tandem for efficient and accurate system servicing.

APSM 178A, (Year 5 Semester 4, Module 28-ALL), Ventilation Verification and Indoor Air Quality) Students go through the International Certifications Bureau exam for VVIAQ Technicians. This certification involves a knowledge of the HVAC system's exposure to contaminants which can impact the air quality within the system. Pressures are read and documented across filters, coils and other components and the documentation lives in contract drawings.

3. **Interpreting Results**
   Interpret experimental results and draw reasonable conclusions.
   - Matching course component(s):

Beyond data collection, students must draw logical conclusions from experimental results. This outcome ensures students can compare observed values against expected performance data, identify trends, and assess anomalies. The ability to interpret results is critical for tasks such as system performance diagnostics, failure analysis, and experimental troubleshooting.

Scientific literacy includes not just data acquisition, but the discernment to evaluate what the data means. Interpretation bridges the experimental phase with theory and practical application, and helps students understand causality, system behavior, and design intent.

APSM 181C, (Year 5 Semester 2, Module 26-3, Building Automation Controls and Advanced Technologies) Students perform the functions of programming an automated system to control HVAC components. The test records for measurements of pressure, flow, and temperature are used to correctly adapt and control a system to achieve a design standard.

APSM 152C, (Year 1 Semester 2, Module 3-4, OSHA Stairways and Ladders) Students learn the proper setup of ladder systems as it relates to jobsite conditions. Provided guidelines for situational awareness on a project, students are able to explore proper ladder setup and engineering control concerns in an active jobsite and classroom application. The conclusions drawn for safety management systems allow for students to complete work associated with building trades service while maintaining OSHA compliance and protecting individual health.

4. **Statistical Data Analysis**
   Analyze data statistically and assess the reliability of results.
   - Matching course component(s):

General Education Review Request
Area 5 - Natural Sciences (with Lab)

Students throughout the apprenticeship analyze data both for technical aspects of the trade, as well as safety precautions and concerns while performing service work. Students gain knowledge of OSHA regulations and reporting procedures, and demonstrate the ability to analyze engineered controls for safety.

APSM 152C, (Year 1 Semester 2, Module 3-3, OSHA Health and Safety Management) Students learn the guidelines to OSHA safety Health and management systems. The course covers statistics of safety hazards and explores case studies related to health and safety inspections conducted by OSHA. Students gain the knowledge of situational awareness when confronted with hazards of the jobsite, and learn to explore company procedures for proper hazard reporting and mitigation.

APSM 152C, (Year 1 Semester 2, Module 3-5, OSHA Struck by Hazards) Students analyze the data provided from OSHA reporting which covers injuries related to "struck by" hazards. Technicians work with tools in environments where not only do you have to consider the health and welfare of yourself, but others placed around the hazard. Struck by injuries can result from work being done overheads.

5. **Evaluating Experiment Design**
   Design and conduct, as well as critically evaluate the design of experiments for validity and reliability.
   - Matching course component(s):

Service technicians evaluate the design of HVAC systems to verify functioning, and troubleshooting issues related to mechanical parts, controls, sensors, or system design. A service technician gains tools to evaluate an existing system, and provide reliable fixes for issues experienced in airflow, electrical current, or hydronic data.

APSM 178C, (Year 5 Semester 4, Module 29-2, Energy Auditing) Students work to evaluate the energy consumption in existing buildings and determine best practices to lower energy impact and cost. The HVAC system uses the majority of a buildings energy so quantifying the usage and retrofitting can reduce consumption and provide a better functioning system.

APSM 177B, (Year 5Semester 1, Module 27-1, Control Programming) Students learn to design and control a Variable air Volume system. These systems use sensors and controllers to minimize the environmental impact of the HVAC system. Students test theories for designing this system and are tested in the actual installation, wiring, documentation and functioning of the system.

Submit your completed form to your Division Curriculum Reps

Requesting Faculty: Robert Cormia Date: 5/14/25

Division Curriculum Rep: Tim Myres Date: 5/19/25

General Education Review Request
Area 5 - Natural Sciences (with Lab)

FOR USE BY CURRICULUM OFFICE:

Approved: ___ Denied: ____ CCC Co-Chair Signature: _____Date: _____

General Education Review Request
Area 5 - Natural Sciences (with Lab)

Degree Program Addendum

If you are submitting a complete degree program (sequence of courses) to fulfill the requirements for this General Education Area, please provide a justification for why a sequence is being proposed instead of a single course. This justification must clearly demonstrate how the sequence, taken as a whole, meets the **Breadth** and **Depth** criteria outlined for this area.

The justification should also touch on how the sequence of courses:

Integrates learning outcomes (The sequence is designed as a cohesive program where learning outcomes are distributed across courses to achieve the required breadth and depth.)

and provides

Progressive development (The sequence builds skills or knowledge progressively, with later courses dependent on foundational learning established in earlier ones.)

Instructions for Mapping Degree Programs

1. Identify which courses in the sequence address specific **Mandatory Depth Outcomes** and **Optional Depth Outcomes**.
2. Provide a clear explanation of how each course contributes to fulfilling the **Breadth** criteria, noting any overlaps or unique contributions within the sequence.
3. Ensure the justification highlights the interdependence and integration of the courses within the sequence.

Example:
Course A introduces foundational concepts in literature and philosophy, addressing Depth Outcomes 1 and 3. Course B expands on these foundations through artistic and historical analysis, addressing Depth Outcomes 2, 4, and 5. Together, the sequence fulfills all mandatory outcomes and optional outcomes 1 and 3.

Your Response:

The Building Trade Service program is a holistic program of study for students in the air-conditioning mechanics apprenticeship program. The academic training students receive is not dispensed in the traditional model of a single course focused on a specific academic discipline; rather, the BTS sequence of courses introduces students early on to concepts and ideas that they then need to practice and refine as the sequence of courses continues across the five years of the program. From the start of the BTS program, students learn to address safety concerns, and OSHA regulations through the study of an OSHA 30 qualification. This is referenced in the mandatory depth criteria APSM 152A, (Year 1 Semester 1, Module 1-5, OSHA Electrical Hazards). This program ties into many subsequent classes throughout the program such as APSM 153B, (Year 1 Semester 2, Module 4-3, Troubleshooting Electric Motors) referenced in mandatory depth criteria, as students interact with live electrical parts in order to trouble shoot and service mechanical equipment. **I**n the mandatory depth lab criteria students learn the process of navigating project plans referenced as APSM 157A, (Year 3 Semester 2, Module 14-7, A

closer Look at Plans). This course directly ties to many subsequent courses referenced including APSM 173C, (Year 3 Semester 1, Module 19-5 Performing a Duct Traverse), where students are required to locate HVAC fittings to perform airflow measurements. The program builds on scientific principles such as thermal dynamics, hydronic movements and airflow calculations. An example referenced in the pattern is APSM 174B, (Year 3 Semester 4, Module 22-5, TAB Technician Review Air), and APSM 174B, (Year 3 Semester 4, Module 22-5, TAB Technician Review Water) showing the relationship of parts in an HVAC system.

Students in the BTS program begin learning quantitative reasoning in their first service introduction and safety class, but they are challenged to then deepen their understanding of these concepts and ideas in classes later in the program like Plans & Specifications for the Service Technician and Hydronic Systems, Pumps & Hydronic Balancing. Testing students' knowledge in new situations, including in on the job work performance is a feature of the apprenticeship program.

The BTS program applications reflect this approach both in breadth and depth. For example, the communications breadth standard is met throughout the program as students are required to write up their findings, give presentations to stakeholders and fellow students, and communicate in the language of the industry and the profession. This breadth requirement is further underscored by the depth requirements of the oral communication and critical thinking GE standards where students are taught to employ logic and consider audience when writing and presenting.

The BTS program is more than the sum of its parts. It reflects a more nuanced approach to teaching and learning, one that is constantly providing context and meaning for students as they are learning and progressing through the program, and one not easily untangled from the program as a whole. It may be more useful, then, to think of this program as one enormous classroom, a classroom in which all GE disciplines are happening all at once. If you trace snapshots of the curriculum over the five years, you will see the learning unfolding, but you don't get the whole picture from a single course in the program. These students aren't majoring in a program they are becoming its practitioners.

General Education Review Request
Area 7 - Lifelong Learning

Course Number & Title or Degree Program Name: Air Conditioning Mechanic Program
Indicate if this is: ☐ a course, or X a degree program

Overview:
Foothill College's General Education curriculum provides students with a well-rounded education, fostering critical thinking, communication, and interdisciplinary understanding. Faculty play a central role in ensuring GE courses align with these goals and prepare students for academic, professional, and civic success.

This form guides instructors in demonstrating how their course meets the learning outcomes for its designated GE area. Instructors should explain how their course develops analytical and communication skills, integrates diverse perspectives, and fosters interdisciplinary connections. Your contributions help maintain a rigorous and relevant GE curriculum that supports student achievement.

Breadth Criteria:
Foothill College's General Education curriculum equips students with broad and deep knowledge, preparing them to be independent thinkers and engaged members of a diverse society. GE courses encourage intellectual curiosity, interdisciplinary exploration, and critical engagement with the world.

Students gain exposure to a range of disciplines, including the arts, humanities, natural sciences, social sciences, and mathematics. This breadth fosters connections across fields and deepens understanding of cultural, social, and physical environments.

All GE courses emphasize critical analysis and ethical reasoning, challenging students to evaluate complex issues, articulate perspectives, and engage thoughtfully with diverse viewpoints. The curriculum also promotes equity, inclusion, and global awareness, ensuring students are prepared to contribute meaningfully to an interconnected world.

A completed GE pattern enables students to acquire, apply, and demonstrate competence in essential academic and professional competencies.

Depth Criteria for Area 7 - Lifelong Learning:
Courses in Lifelong Learning empower students with the knowledge, skills, and attitudes necessary to adapt and thrive in an ever-changing world. These courses focus on the holistic development of individuals as integrated intellectual, physiological, social, and psychological beings in relation to their communities and the environment. Lifelong learning emphasizes the ability to apply acquired knowledge across disciplines, encouraging students to think critically, solve problems, and make informed decisions in diverse contexts.

A key component of this area is experiential learning, where students are provided opportunities to bridge disciplines and apply skills in real-world settings. These experiences foster independence, adaptability, and effectiveness as lifelong learners.

General Education Review Request
Area 7 - Lifelong Learning

Foothill College also recognizes the importance of physical activity in supporting lifelong learning. Physical activity courses are included in this area, provided they involve movement overseen by a faculty member.

Instructions for Mapping Course Components to Criteria

Please follow the steps below to demonstrate how your course (or degree program) fulfills the Breadth and Depth criteria for General Education Area 7 - Lifelong Learning. Use specific components from the Course Outline of Record (COR), such as course outcomes, expanded content, methods of instruction/evaluation, and/or lab content.

If mapping a degree program, please indicate from which course in the sequence you are sourcing COR components.

Breadth Mapping

For each of the following competencies, indicate if and how your course or degree program meets the requirement and provide corresponding course component(s) from the COR.

1. **Communication**
   Analytical reading, writing, speaking, and listening skills, including evaluation, synthesis, and research.
   - Matching course component(s):

Building Trade Services students utilize fundamental communication skills throughout their program to achieve their course outcomes. Students must interpret construction documents and specifications to evaluate whether the systems perform as designed. They produce formal documentation using charts and reports to present findings from mechanical testing. Students must synthesis information demonstrated by converting measurements to Total Dynamic Head, chart data, and synthesize this into reports that evaluate operational compliance. Interaction, both verbal and in listening, with team members is essential to make sure the performance data and operational sequences perform accurately.

APSM 177A, (Year 4 Semester 4, Modules 23-ALL, Mechanical Acceptance Testing) Students learn the requirements to attain a mechanical acceptance technician certification through the International Certification Bureau. Students engage in communication orally, diagrammatically, and in written documents to understand the functioning of a building's system in order to test proper equipment functioning. Once the system's functioning is evaluated and compared to construction documents, the Service technician then documents the readings in formalized charts and presents the material for official project documentation.

General Education Review Request
Area 7 - Lifelong Learning

APSM 174A, (Year 4 Semester 2, Modules 21-3, Measuring Pump Performance Data and Pump Curves) Students demonstrate the process of measuring a pump's performance. This information is correlated to a pump curve which plots readings of pressure and converts the readings to Todal Dynamic Head or pressure. This information is then categorized in chart form to verify the operating condition of a pump and back check this data against project documents and submittals. Communication is used to gain access to performance data information, sequence of operations, and pump access.

2. **Computation**
   Application of mathematical concepts or principles of data collection and analysis to solve problems.
   - Matching course component(s):

Building Trade Service Students are applying both measurement techniques and mathematical conversions to collect, analyze, and interpret airflow data—using that analysis to solve operational problems in mechanical systems. They do this specifically gathering raw pressure readings at multiple points within a duct system and converting the data into industry standard formulas. Students must use the data to solve problems such as inadequate fan performance, poor duct design, blockages, safety risks due to improper airflow, diagnose balancing issues and in determining causes for poor performing equipment.

APSM 173C, (Year 3 Semester 1, Module 19-5, Performing a Duct Traverse) Students perform the functions of a duct traverse which collects readings of pressure in a duct system. The pressure readings are then converted using mathematical formulas to cubic feet per minute of airflow (CFM). This data is used to detect deficiencies within a system such as fan operating issues, duct system design issues, obstructions within a system, and life safety concerns.

APSM 173C, (Year 3 Semester 1, Module 19-4, Measure Airflow at Registers) Students perform the functions of measuring air using various tools within the industry such as flow hoods, rotating vane anemometers, and air data multi meters. These readings are taken in units of pressure and applied to formulas to be converted to readings of cubic feet per minute of air. This data is used to solve problems within a system such as balancing concerns, system design issues, and equipment failures.

3. **Critical Expression**
   Clearly and precisely express ideas in a logical and organized manner using discipline-appropriate language.
   - Matching course component(s):

Students in the Building Trade Service are taught the importance of clear and critical communication for health and safety. For example, students collect and interpret multiple data sources—including manufacturer specs, field measurements, and project drawings—to calculate the total energy impact of a system. This consistency and correctness are important for the efficiency of the system which will impact other systems.

General Education Review Request
Area 7 - Lifelong Learning

APSM 178C, (Year 5 Semester 4, Module 29-2, Energy Audits and Utility Structures) Students learn the process of energy auditing as it relates to a mechanical system. Students interpret manufacturer data, project drawings and take measurements to calculate the total energy impact of a building's system.

APSM 157A, (Year 3 Semester 2, Module 14-9, Types of Drawings and Their Components) Students learn to read and interpret construction drawings and identify components within a system's drawings. This process involves a demonstration of the ability to locate equipment and interpret the symbols, measurements, and notes within construction drawings.

4. **Community and Global Awareness**
   Consideration of one's role in society at local, national, and global levels in the context of cultural constructs and historical/contemporary issues.
   - Matching course component(s):

Students in the Building Trade Service program are learning how to provide universal safety and health standards that expand all localities and cultural groups. The coursework teaches a sense of civic and global responsibility in students by connecting their technical knowledge to historical events, societal needs, and the health and safety of communities worldwide. Students examine case studies of major fire and smoke events from around the world (e.g., high-rise fires, transportation hubs), exploring how these tragedies led to safety codes and design innovations**.** By studying these incidents and their aftermaths, students gain insight into how public expectations and regulatory bodies evolve based on cultural values, safety needs, and technological capabilities. Additionally, students study the evolution of IAQ measures—from basic filtration and water treatment to modern certification systems, showing how societal health concerns have shaped the mechanical trades over time.

APSM 180C, (Year 3 Semester 3, Module 17-4, Indoor Air Quality) Students learn the process of auditing a building's indoor air quality. The students engage in classroom discussion and hands on activities to achieve the indoor air quality certification through the International Certification Bureau.

APSM 174C, (Year 4 Semester 4, Module 24-11, Fire Smoke Damper Training) Students learn the historical data which governs current Fire Smoke Damper installation and design within a system. Current developments in smoke mitigation derived from catastrophic case studies, which have been compiled globally, and the codes which stemmed from these catastrophes have altered smoke control plans, and code cycles which govern building standards.

5. **Information and Digital Literacy**
   The set of integrated abilities that includes: the reflective discovery of information, the understanding of how information is produced and valued, the use of information in creating new knowledge, the ethical participation in communities of learning, and the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.
   - Matching course component(s):

General Education Review Request
Area 7 - Lifelong Learning

Students in the Building Trade Service program are taught how to responsibly access and use technical data through digital tools to solve real-world system issues in an environmentally responsible and ethically sound manner. Students must assess what data is needed (e.g., system pressure, temperature, flow rates) to properly program automation systems and achieve design goals. Then they analyze the collected system data and apply it in configuring automated controls—ensuring efficient, responsive system performance under varying loads. Students engage with building automation software**,** control interfaces, and digital instrumentation to actively program and adjust systems based on real-time feedback.

APSM 156A, (Year 2 Semester 1, Module 7-1, Heat Pumps) Service Apprentices learn how to evaluate submittal documents from vendors and confirm proper function of Heat Pumps in a system. Correct installation, functioning and maintenance is critical in reducing a building's energy and environmental impact. The service technician uses digital tools to take readings of pressure, and airflow to operating conditions and compare these conditions to submittal data.

APSM 181C, (Year 5 Semester 2, Module 26-3, Building Automation Controls and Advanced Technologies) Students perform the functions of programming an automated system to control components. The test records measurements of pressure, flow, and temperature used to correctly adapt and control a system to achieve a design standard.

Depth Mapping

<u>Mandatory</u> Depth Outcomes

Your course must address all the following outcomes. For each outcome, map the corresponding course component(s) from the COR.

1. **Cross-Disciplinary Application**
   Acquire and demonstrate knowledge, skills, and attitudes that can be applied across two or more disciplines of study.
   - Matching course component(s):

Building Trade Service students are exposed to a number of disciplines in their program including electrical engineering, computer science, technical communication, safety engineering, and mechanical system diagnostics. For example, students learn about the entirety of the HVAC system. This includes HVAC system design**,** mechanical drawing interpretation, and fluid dynamics (chilled water piping), engaging multiple engineering and design domains. This process blends the process of theory and application for real life practice.

APSM 181B, (Year 5 Semester 1, Module 25-1, Electronic Control Systems) Students learn the functions and components of an electric control system, and how analog components relate to computer control programming. This area crosses disciplines, and skills as it relates to the field of electrical theory, computer programming, communication skills, print reading, and safe work

practices while working on live components. A student learns the interrelationship of parts, and how to manipulate modes of testing to achieve desired outcomes.

APSM 156C, (Year 2 Semester 2, Module 9-1, Chilled Water and HVAC system and Components) Students learn the functions and components of a chilled water system as it relates to HVAC components. This practice crosses disciplines of study, as it relates to a knowledge of chilled water piping and its components, reading mechanical drawings showing water lines, and practicing safe work protocols while working on a live high pressure water system.

2. **Practical Problem-Solving Tools**
   Develop practical tools for problem-solving and decision-making that address current issues and adapt to future situations.
   - Matching course component(s):

Building Trade Service students are taught in their coursework and through real life application how to solve problems. Students learn the importance of testing for safety and efficiency and develop solutions for improvement. Students analyze motor performance by comparing real-time measurements against manufacturer data and project specifications, developing diagnostic and evaluation tools based on scientific principles. When design changes alter system dynamics (e.g., airflow, pressure), students must adapt solutions based on real-world conditions, demonstrating practical flexibility and innovation. The process culminates in performing or guiding repairs, reinforcing the problem-solution cycle and building competence in decision-making.

APSM 153B, (Year 1 Semester 2, Module 4-3, Troubleshooting Electric Motors) Students learn the process of testing electric motors against manufacturer data and project specifications to achieve design criteria. The process of trouble shooting motors, involves known scientific data of airflow and pressure movement and utilizes tools and equipment such as rotating vane anemometers and air multimeters to take active readings, and adapt to system conditions. Often redesign in a system alters the functioning of flow, therefore a service technician must make judgements which can create optimal performance of an HVAC system.

APSM 158A, (Year 2 Semester 3, Module 11-3, Trouble Shooting Basic Controls) Students learn how to trouble shoot and interact with a building's automated control system. The service technician takes active readings while sending an HVAC system digitally into testing modes.

3. **Health and Well-Being Awareness**
   Comprehend and apply principles of health and well-being to individuals and society, fostering physical and mental wellness.
   - Matching course component(s):

Throughout the Building Trade Service program students are taught to respect the risky nature of job sites as instruction stresses the importance of mental health and physical safety. Through the pursuit of an OSHA 30 qualification, students engage deeply with national standards in occupational safety and

health. Students learn how to implement engineering controls, choose the correct personal protective equipment (PPE), and apply hazard mitigation strategies. Students are empowered to make decisions that reduce risk and enhance wellness on the jobsite. Students are trained to identify common jobsite exposures (e.g., chemicals, refrigerants, asbestos, silica), which is vital to protecting their own health and the health of others including society as a whole.

In addition to identifying physical risks, students are introduced to the mental health challenges prevalent in the construction industry, including stress, fatigue, and substance use, which are now widely recognized as significant safety concerns.

APSM 152A, (Year 1 Semester 1, Module 2-6, Health Hazards in Construction) Students continue the process of achieving an OSHA 30 qualification. Understanding health hazards in construction is important for building the knowledge base to demonstrate situational awareness on a jobsite. Knowing more of common health exposures in the jobsite allows a technician to provide the proper engineering controls, personal protective equipment, or hazard mitigation when performing tasks related to servicing equipment. Exposure to chemicals, refrigerants, asbestos, silica, are just some of the hazards in construction which can impact the health and wellbeing of the worker.

APSM 152A, (Year 1 Semester 1, Module 2-6, Health Hazards in Construction) Students continue the process of achieving an OSHA 30 qualification. Understanding health hazards in construction is important for building the knowledge base to demonstrate situational awareness on a jobsite. Knowing more of common health exposures in the jobsite allows a technician to provide the proper engineering controls, personal protective equipment, or hazard mitigation when performing tasks related to servicing equipment. Exposure to chemicals, refrigerants, asbestos, silica, are just some of the hazards in construction which can impact the health and wellbeing of the worker.

4. **Ethical and Effective Information Use**
   The set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning.
   - Matching course component(s):

Building Trade Service students learn to evaluate information early in the program and consistently through the years. Students must interpret and evaluate construction documents, building plans, and HVAC system specifications to determine if mechanical systems function as intended. Often students are tasked with finding and locating submittal data and documents from vendors and building engineers of record. Real-time system data is collected through diagnostic tools and compared against expected outcomes. This analysis reflects the practical use of technical information in field conditions. Students are trained to communicate findings orally (discussions with teams/clients), diagrammatically (system schematics and test results), and in written formats (formal reports and state-required documentation). The process includes official documentation submitted for state regulatory compliance (California permitting standards). This reflects the legal significance of accurate, ethical reporting—where falsified or incomplete data can result in failed inspections or penalties.

General Education Review Request
Area 7 - Lifelong Learning

APSM 177A, (Year 4 Semester 4, Modules 23-ALL, Mechanical Acceptance Testing) Students learn the requirements to attain a mechanical acceptance technician certification through the International Certification Bureau. Students engage in communication orally, diagrammatically, and in written documents to understand the functioning of a building's HVAC system in order to test proper equipment functioning. Once the system's functioning is evaluated and compared to construction documents, the Service technician then documents the readings in formalized charts and presents the material for official project documentation. This documentation is required in the State of California when commissioning projects which require permitting.

APSM 151A, (Year 1 Semester 1, Modules 1-6, EPA 608) Students learn the fundamentals of evacuating, charging, and disposing of refrigerants. Federal guidelines regulate the ethical disposal of refrigerants, and therefore it is required for any technician who handles this chemical to be certified. A technician who is not certified can incur enormous fines, and contractors can lose additional licensing depending on the severity of the crime.

5. **Critical Analysis of Contemporary Issues**
   Identify and analyze current issues that influence health, communication, and learning within diverse communities.
   - Matching course component(s):

Building Trade Service students learn to evaluate information early in the program and consistently through the years. Students must interpret and evaluate construction documents, building plans, and HVAC system specifications to determine if mechanical systems function as intended. Often students are tasked with finding and locating submittal data and documents from vendors and building engineers of record. Real-time system data is collected through diagnostic tools and compared against expected outcomes. This analysis reflects the practical use of technical information in field conditions. Students are trained to communicate findings orally (discussions with teams/clients), diagrammatically (system schematics and test results), and in written formats (formal reports and state-required documentation). The process includes official documentation submitted for state regulatory compliance (California permitting standards). This reflects the legal significance of accurate, ethical reporting—where falsified or incomplete data can result in failed inspections or penalties.

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chemical to be certified. A technician who is not certified can incur enormous fines, and contractors can lose additional licensing depending on the severity of the crime.

<u>Optional</u> Depth Outcomes

In addition to the mandatory outcomes, your course or sequence must address **at least two** of the following outcomes. For each selected outcome, map the corresponding course component(s).

1. **Career and Life Planning**
   Define career and life planning strategies, including goal setting, time management, learning styles, and self-awareness, while fostering leadership and a positive work ethic.
   - Matching course component(s):

Building Trade Service students are taught how to navigate the apprenticeship program's academic and technical requirements, helping them plan their journey not just for the present term but across the entire duration of their training and into their careers**.** Emphasis is placed on understanding the structure of technical certifications, ongoing education requirements, and the long-term expectations of being a skilled tradesperson who must stay up to date with evolving industry standards. Students are set up with practical instruction in notetaking**,** study techniques**,** and managing deadlines teaching students to plan their time effectively — both for classroom success and job site responsibilities. Assignments and class discussions focus on setting achievable short- and long-term goals, such as passing a module, earning a certificate, or qualifying for specialized positions (e.g., foreperson).

APSM 151A, (Year 1 Semester 1, Module 1-3, Classroom Survival Skills) Students gain knowledge into the apprenticeship program school requirements, and learn methodologies for practical note taking, time management, and using resources effectively in a classroom setting. Throughout a service technician's career, there are continued requirements for new certifications, and new training opportunities. This class sets an individual for a long-standing career of being a student in the trade and gaining effective outcomes through proper planning.

2. **Bias and Social Awareness**
   Analyze beliefs, attitudes, biases, stereotypes, and behaviors in individuals and communities, especially regarding contemporary societal challenges.
   - Matching course component(s):

Business Trade Service students explore how unconscious biases, and social stereotypes can influence how individuals perceive others and make decisions — often without realizing it. They take a specific course that highlights how these biases may affect judgments of competence, leadership, and success, both in education and in the workplace. Students are encouraged to reflect on their own assumptions and how they might unintentionally reinforce barriers to inclusion**.**

APSM 151A, (Year 1 Semester 1, Module 1-2, Bias and Belonging) Students gain perspective on addressing the effects of implicit bias and understanding stereotypes which can shape decision making. It is important for individuals to make decisions based on proper assessments of success, rather than

societal bias. Throughout the apprenticeship, students use the tools of bias and belonging to shape interactions with members of society from diverse communities and different socio-economic backgrounds.

3. **Physical Fitness and Mental Health**
   Understand the importance of physical fitness and its impact on an individual's physical and mental health.
   - Matching course component(s):

Safety is at the core of the Building Trade Service program which includes the physical and mental health of the students themselves. Students learn that in the construction trades, physical health is directly tied to job performance and injury prevention**.** Instruction teaches the common risks such as repetitive motion injuries, strains, and overexertion—many of which are preventable through proper physical fitness practices. This includes instruction on daily "stretch and flex" routines, which are increasingly adopted by employers to reduce workplace injuries and improve long-term musculoskeletal health. The OSHA curriculum also touches on mental health stressors in construction, including fatigue, burnout, and the mental strain of high-risk environments.

APSM 152C, (Year 1 Semester 2, Module 3-4, OSHA Safety and Health Management) Students go through the process of attaining an OSHA 30 qualification which addresses issues in the field of construction which impact one's health. For construction workers, a common physical injury can result from repetitive motion, and lack of stretching. This is the reasoning for many construction companies requiring "stretch and flex" as part of the daily tasks for a worker to complete. Lack of stretching, or improper stretching can lead to strains, and injuries from the physical nature of construction.

4. **Technology Integration**
   Use technology effectively to analyze problems and create innovative solutions in personal, academic, and professional contexts.
   - Matching course component(s):

Building Trade Service students must recognize the technology knowledge needed on the job as more systems migrate over to digital advancements. DDC systems are increasingly used in smart buildings, where energy efficiency, sustainability, and occupant comfort depend on automated responses managed through digital technologies. By interpreting this sensor data, students isolate system faults or inefficiencies — such as incorrect sensor readings, communication errors, or malfunctioning equipment — which forms the foundation of technologically driven problem-solving**.** Once problems are identified, students apply digital tools to reprogram control sequences**,** adjust setpoints**,** or reconfigure system logic to resolve issues without replacing hardware — demonstrating the power of software-based solutions in a physical system.

APSM 177B, (Year 5 Semester 3, Module 27-1, Direct Digital Control Strategies) Students learn the process of trouble shooting Direct Digital Controls attached to an HVAC system. This process requires technological training and accessing a building automation system through digital devices and network

connections. Active monitoring of digital sensors allows a technician to isolate equipment or issues within an HVAC design and begin replacements or repairs.

5. **Interpersonal and Communication Skills**
   Develop skills for effective communication, teamwork, and collaboration in diverse personal, academic, and professional settings.
   - Matching course component(s):

Building Trade Services students learn how to appropriately address and communicate workplace concerns related to union conditions, such as hours, wages, job duties, and safety. They are taught how to interpret and apply the collective bargaining agreement (CBA)**,** equipping students with the ability to ask informed questions, present concerns respectfully, and seek resolutions through the correct channels. These skills translate directly into real-world professional communication, where clarity, confidence, and respect for formal processes are essential.

Additionally, by engaging with business representatives, instructors, and fellow apprentices from a variety of socio-economic, cultural, and professional backgrounds, students learn to build teams, collaborate and communicate effectively across diverse workplace cultures**.**

APSM 151A, (Year 1 Semester 1, Module 1-4, Discussion with Business Representatives) Students learn the proper channels to communicate issues related to the collective bargaining agreement of sheet metal workers. This line of study provides reference material for students to consult the collective bargaining agreement to verify that conditions are upheld according to the union contract. This course is a group training in which students collaborate from various perspectives and shows reference material and resources to navigate the career.

Submit your completed form to your Division Curriculum Reps

Requesting Faculty: Gina Fitzpatrick Date: 5/10/25

Division Curriculum Rep: Tim Myres Date: 5/19/25

FOR USE BY CURRICULUM OFFICE:

Approved: ___ Denied: ____ CCC Co-Chair Signature: _____Date: _____

General Education Review Request
Area 7 - Lifelong Learning

Degree Program Addendum

If you are submitting a complete degree program (sequence of courses) to fulfill the requirements for this General Education Area, please provide a justification for why a sequence is being proposed instead of a single course. This justification must clearly demonstrate how the sequence, taken as a whole, meets the **Breadth** and **Depth** criteria outlined for this area.

The justification should also touch on how the sequence of courses:

Integrates learning outcomes (The sequence is designed as a cohesive program where learning outcomes are distributed across courses to achieve the required breadth and depth.)

and provides

Progressive development (The sequence builds skills or knowledge progressively, with later courses dependent on foundational learning established in earlier ones.)

Instructions for Mapping Degree Programs

1. Identify which courses in the sequence address specific **Mandatory Depth Outcomes** and **Optional Depth Outcomes**.
2. Provide a clear explanation of how each course contributes to fulfilling the **Breadth** criteria, noting any overlaps or unique contributions within the sequence.
3. Ensure the justification highlights the interdependence and integration of the courses within the sequence.

Example:
Course A introduces foundational concepts in literature and philosophy, addressing Depth Outcomes 1 and 3. Course B expands on these foundations through artistic and historical analysis, addressing Depth Outcomes 2, 4, and 5. Together, the sequence fulfills all mandatory outcomes and optional outcomes 1 and 3.

Your Response:

The Building Trade Service program is a holistic program of study for students in the air-conditioning mechanics apprenticeship program. The academic training students receive is not dispensed in the traditional model of a single course focused on a specific academic discipline; rather, the BTS sequence of courses introduces students early on to concepts and ideas that they then need to practice and refine as the sequence of courses continues across the five years of the program. From the start of the BTS program, students gain the safety knowledge and certification to evacuate refrigerant (APSM 151A, (Year 1 Semester 1, Modules 1-6, EPA 608). This certification ties into the remaining 5 years of the program, and a life-long career by allowing students to handle and recover refrigerant when servicing equipment. This EPA certification attained ties into subsequent classes such as APSM 156C, (Year 2 Semester 2, Module 9-1, Chilled Water and HVAC system and Components) and is referenced in mandatory depth criteria. BTS students begin the program with tools to navigate the program, and career with Optional depth referenced such as APSM 151A, (Year 1 Semester 1, Module 1-3, Classroom

Survival Skills). This course ties directly into all remaining referenced classes, as students learn note taking concepts, and tools to navigate through the apprenticeship program. In the noted mandatory depth criteria such as APSM 177A, (Year 4 Semester 4, Modules 23-ALL, Mechanical Acceptance Testing), BTS students learn the functioning of HVAC equipment as it relates to code and design criteria. This provides life long career knowledge as students verify active functioning of equipment against design documents.

For example, students in the BTS program begin learning quantitative reasoning in their first service introduction and safety class, but they are challenged to then deepen their understanding of these concepts and ideas in classes later in the program like Plans & Specifications for the Service Technician and Hydronic Systems, Pumps & Hydronic Balancing. Testing students' knowledge in new situations, including in on the job work performance is a feature of the apprenticeship program.

The BTS program applications reflect this approach both in breadth and depth. For example, the communications breadth standard is met throughout the program as students are required to write up their findings, give presentations to stakeholders and fellow students, and communicate in the language of the industry and the profession. This is referenced in the program with APSM 177A, (Year 4 Semester 4, Modules 23-ALL, Mechanical Acceptance Testing). This breadth requirement is further underscored by the depth requirements of the oral communication and critical thinking GE standards where students are taught to employ logic and consider audience when writing and presenting.

The BTS program is more than the sum of its parts. It reflects a more nuanced approach to teaching and learning, one that is constantly providing context and meaning for students as they are learning and progressing through the program, and one not easily untangled from the program as a whole. It may be more useful, then, to think of this program as one enormous classroom, a classroom in which all GE disciplines are happening all at once. If you trace snapshots of the curriculum over the five years, you will see the learning unfolding, but you don't get the whole picture from a single course in the program. These students aren't majoring in a program they are becoming its practitioners.

Minimum Grade Requirement for Foothill GE

Reasons for this discussion at CCC

The newest Title 5 language does not specify a grade requirement of "C" (or "P") or better in any area of local general education for the associate degree (AKA Foothill GE).

Previous Title 5 language required us to have minimum proficiencies in math and English, which required a grade of "C" or better. Other areas of Foothill GE did not have any minimum grade requirement. Now that minimum proficiencies are no longer required by Title 5 and have been incorporated into the new Foothill GE pattern (which goes into effect for 2025-26), we need to decide if we should establish a minimum grade requirement for some, or all, areas of Foothill GE.

What are other colleges doing?

Cañada:

- "C" or better in three GE areas: English, Critical Thinking and Communication, and Math
- Other areas can be satisfied with a "D" grade

Gavilan:

- "C" or better in three GE areas: English, Critical Thinking and Communication, and Math
- Other areas can be satisfied with a "D" grade

College of Marin:

- "C" or better in ENGL 1A course, as well as in one GE area: Math
- Other areas can be satisfied with a "D" grade

Hartnell:

- "C" or better for both GE and major prep courses

Ohlone:

- "C" (or "P") or better in three GE areas: English, Critical Thinking and Communication, and Math
- Other areas can be satisfied with a "D" grade

LACCD:

- Sticking with the minimum Title 5 requirement, which is a "D" or better in each area of local GE

Mission/West Valley:

- Sticking with the minimum Title 5 requirement, which is a "D" or better in each area of local GE

Chabot:

- Sticking with the minimum Title 5 requirement, which is a "D" or better in each area of local GE

Butte:

- Sticking with the minimum Title 5 requirement, which is a "D" or better in each area of local GE

The Question for CCC

The request of the College Curriculum Committee is to decide on the minimum grade requirement for Foothill GE. Below are options for CCC to consider:

1. Require a grade of "C" (or "P") or better for **two** areas: Area 1A (English Composition) and Area 2 (Mathematical Concepts and Quantitative Reasoning). Allow for **all** other areas to be satisfied with a "D" grade
2. Require a grade of "C" or ("P") or better for **three** areas: Area 1A (English Composition), Area 1B (Oral Communication and Critical Thinking), and Area 2 (Mathematical Concepts and Quantitative Reasoning). Allow for **all** other areas to be satisfied with a "D" grade
3. Require a grade of "C" or ("P") or better for **three** areas: Area 1A (English Composition), Area 1B (Oral Communication and Critical Thinking), and Area 2 (Mathematical Concepts and Quantitative Reasoning). Allow for **one** of the other areas to be satisfied with a "D" grade (if a student uses a "D" grade for one of the other areas, they must have a grade of "C" [or "P"] or better for the remainder)
4. Require a grade of "C" (or "P") or better for the **entire** Foothill GE pattern
5. Require a grade of "D" or better for the **entire** Foothill GE pattern

Important note: Regardless of which option is the final decision, the student must have an overall GPA of 2.0 or higher.

FOOTHILL COLLEGE
College Curriculum Committee
Exception Process for Starting Courses Prior to Catalog Publication

Background
To help student educational planning, Foothill College's normal practice has been to not offer a course prior to publication in the college catalog. However, there are cases in which it would be beneficial to students to run a course prior to publication; for example, the availability of noncredit courses to support student success, prerequisite changes based on C-ID, changes in workforce needs, permanently Stand Alone CTE courses, programmatic accreditation changes, etc. In order to provide flexibility to best serve students, this process allows for an exception to the current practice.

Note our current practice that **new programs** approved by the CCCCO become active immediately, as long as the program courses have previously been published in the catalog.

Process
Requests must be made by the following deadlines:

March 15th for requests pertaining to Summer and Fall quarters
October 15th for requests pertaining to Winter and Spring quarters

Note: submitting a request by the deadline does not guarantee approval. The possibility of approval is determined based on a number of factors, including (for example) whether it is a transfer course and will require articulation prior to publication in the catalog, whether the changes being requested to the course will affect any curriculum sheets (either credit or noncredit), or whether a noncredit certificate must be approved by the State prior to offering the course to earn Career Development and College Preparation (CDCP) funding.

The following process should be followed to request an exception:

A. Course outline of record (COR) must be created/updated in CourseLeaf CIM, approved by the division, and moved to "Curriculum Coordinator Review1" status in CourseLeaf CIM.
    a. Information on COR must be complete and accurate.
    b. Course SLOs must be entered in SLO system—*we are currently transitioning to a new SLO system; in the meantime, SLOs should be presented to the Division Curriculum Committee at the same time that the COR is presented*
    c. Any necessary supplemental forms must be completed within the COR form in CourseLeaf CIM. Forms may include: Content Review for Requisites, Cross-Listed Course Approval Request, Distance Learning Application, Foothill GE Application, Stand Alone Approval Request.
B. The Division Curriculum Reps emails the request to the Associate Vice President of Instruction (CC the Curriculum Coordinator and Articulation Officer).
    a. Request must include the course number(s) as well as the specific reason for the request. If applicable, documentation from the outside entity regarding the change must be attached to the request.
C. The AVP of Instruction reviews the request, which includes determining a timeline for activation.