Diablo Valley College
Engineering Technology Building Design Project
Phase 1

Phase 1: Investigating Program Needs

Curated Portfolio of Findings and Planning Principles

This portfolio of findings provides an overview of data related to Engineering Technology programs, including enrollment trends, student outcomes, discipline-relevant labor market information, and key themes from ET program reviews, surveys of external partners, faculty focus groups, student focus groups, and college site visits.

Integrated Academic Solutions, LLC (September 2022)

Phase 1: Investigating Program Needs

ET Program Enrollment Trends

ET Department enrollment data examined as part of the program needs assessment over four academic years (2018-2019 through 2021-2022) includes four basic sets of metrics with notable implications for space planning - sections, fill rates, WSCH (weekly student contact hours), and FTES/FTEF (full-time equivalent students/full-time equivalent faculty) – which provide indicators of demand, growth, and efficiency.

Sections

Due to consistency in course scheduling, the number of sections offered each semester varied little from year to year. However, the number of sections offered in the ET Department declined in the last few years (e.g., 77 total sections in Fall 2018 to 70 sections in Fall 2021) – most likely as a result of overall declines in student enrollment due to the human toll of the COVID-19 pandemic in 2020 and 2021. In sum, the ET Department offered an average number of 74 sections per regular term. The table below illustrates the four-year average by discipline (presented in descending order).

Discipline	Section Average/Academic Year
ARCHI	22
ENGIN	17
CONST	12
ENGTC	9
ELECT	6
ELTRN	4
IDSGN	2
ENSYS	2

ET ENROLLMENT TREND DATA

The information presented in this section provides a summary of the overall findings regarding the vitality of instructional locations and programs with implications for patterns of growth, stability, or decline. In assessing instructional program data, it is important to be mindful of a variety of factors that impact enrollment, including but not limited to, enrollment management strategies, scheduling patterns, class size maximums, facilities, safety considerations, availability of staff, and recruiting and hiring practices.

Fill Rates

ET Department fill rates ranged over the four-year period from a high of 69% (Fall 2020) to a low of 58% in Spring 2020. The fill rate for the most recent semester (Spring 2022) stood at 59%; however ,the average over the entire four-year period is 63%. The table below illustrates the four-year average for each ET discipline relative to the department's 63% overall average.

Discipline	Four-Year Average Fill Rate
ENGIN	84%
ARCHI	83%
CONST	79%
ELECT	71%
ET DEPT AVG	**63%**
IDSGN	61%
ENGTC	46%
ENSYS	37%
ELTRN	28%

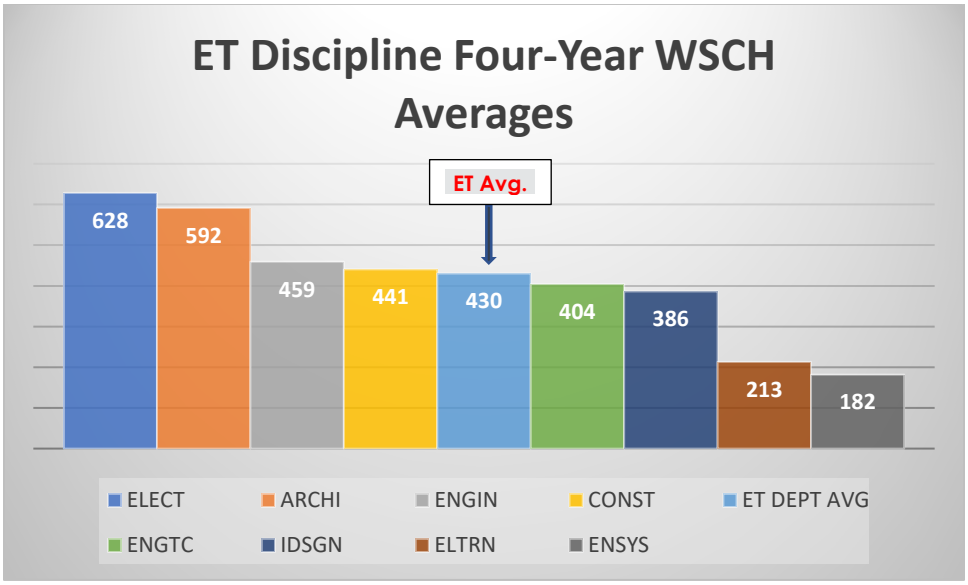
WSCH

WSCH stands for Weekly Student Contact Hours. It is defined as the number of students in a class at census multiplied by the hours of student instruction conducted in that class in a week during a primary (fall or spring) term of an academic year. Because WSCH is used to calculate FTES (full-time equivalent students), it carries significant implications for funding. Additionally, state standards for construction and renovation of facilities basically focus on capacity, which is correlated with the production of WSCH.

Like fill rates, WSCH can vary from semester to semester based upon a variety of scheduling factors. However, as the table below captures, several disciplines have seen increases in WSCH – the most notable in ELTRN and ARCHI.

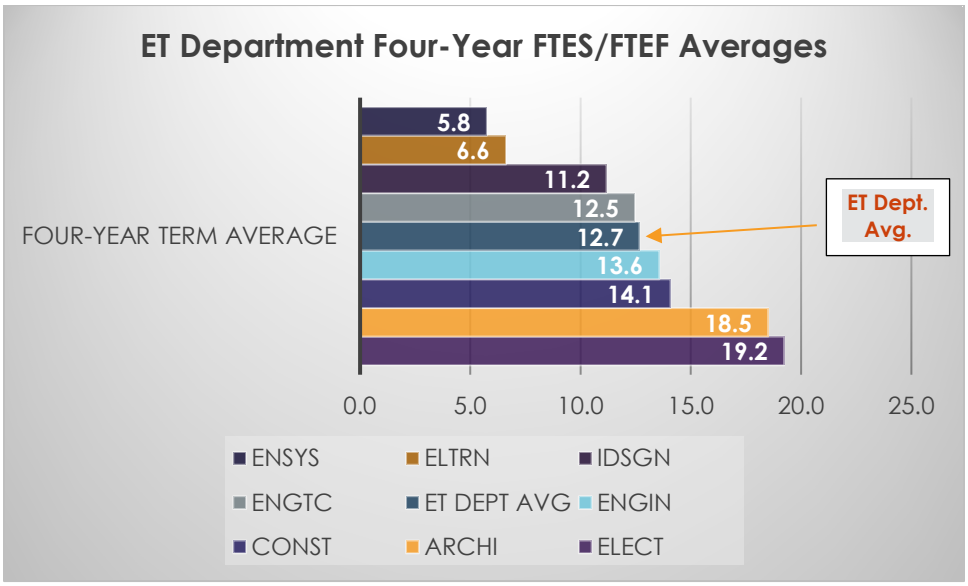
Discipline	AY18-19 Avg.	AY19-20 Avg.	AY20-21 Avg.	AY21-22 Avg.	Four-Year Avg.	Percent Change (2018/19 - 2021/22)
ARCHI	579	533	607	648	592	12%
CONST	489	455	439	380	441	-22%
ELECT	596	628	671	619	628	4%
ELTRN	213	218	177	245	213	15%
ENGIN	446	441	484	466	459	4%
ENGTC	387	446	389	396	404	2%
ENSYS	232	132			182	-100%
IDSGN	382	385	450	327	386	-14%
ET DEPT	**416**	**405**	**460**	**440**	**430**	**6%**

The chart below presents the four-year WSCH averages for ET disciplines relative to the department average of 430.



FTES/FTEF

Community colleges typically use FTES/FTEF as a preferred way of measuring program efficiency over time. Target FTES/FTEF ratios are typically 17.5 per semester or 35 for an academic year. As the chart below shows, four-year term averages for four disciplines (ELECT, ARCHI, CONST, ENGIN) are above the ET Department Average of 12.7; two exceed the 17.5 benchmark (i.e., ELECT and ARCHI).



ET Program Student Outcomes

The data examined in this section includes student headcount, course completion, course success, persistence to the next term, and program awards (i.e., degrees and certificates).

Headcount

While student headcount is often included in program enrollment data, this information is also an important indicator of student access to programs of study. As illustrated in the table below, only one discipline experienced an increase in headcount over the last four academic years (eight regular terms): CONST. (Note: the lack of data for ENSYS since Fall 2020 suggest program suspension or discontinuance.)

DEPT	F18	SP22	Percent Change
CONST	141	150	6%
ENGIN	362	355	-2%
ARCHI	374	361	-3%
ENGTC	111	102	-8%
ELECT	113	93	-18%
ELTRN	32	25	-22%
IDSGN	43	30	-30%
ENSYS	30		-100%

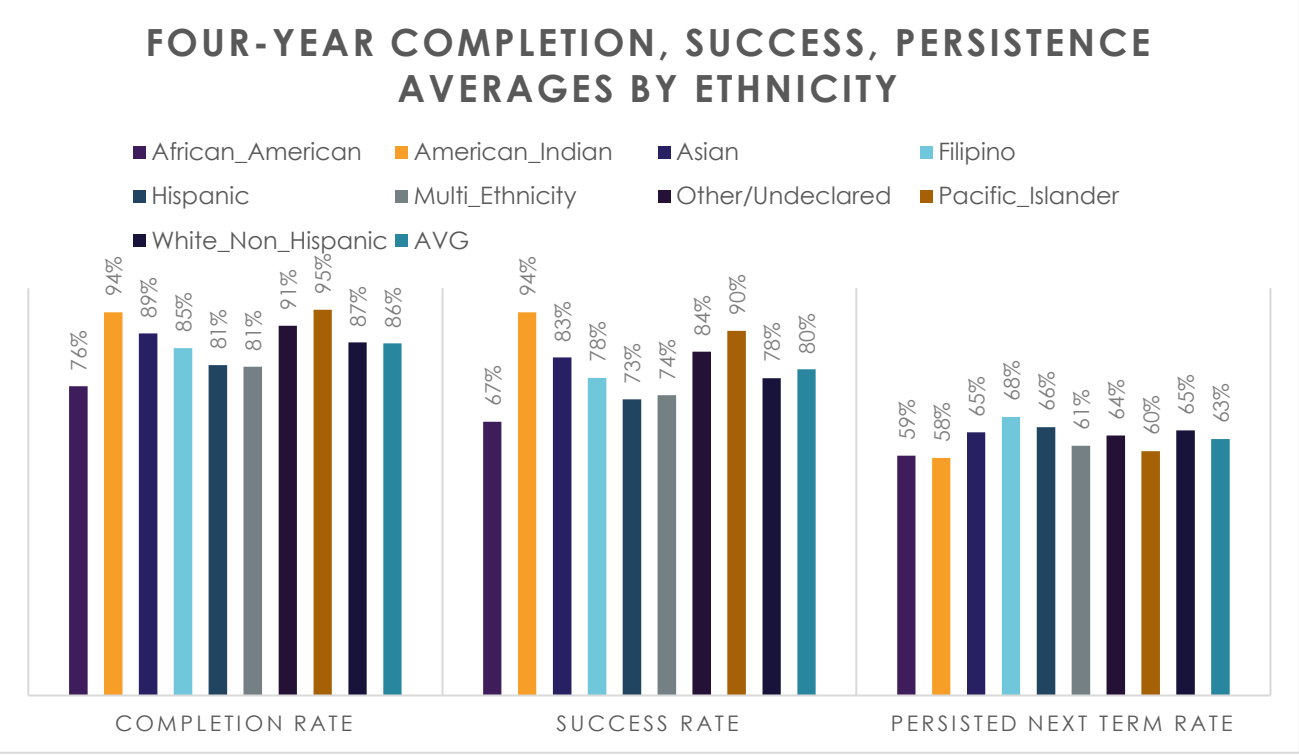
Course Completion, Course Success, and Persistence to Next Term by Ethnicity

Like many California community colleges, DVC serves a diverse population. The most recent data indicates that the College's student population is predominantly White (31%), while 27% of students identify as Hispanic (Latinx), and 18% identify as Asian. Multi-Ethnic students comprise 8% of the student population and only 5% identify as Black or African American. This demographic data provides important comparative context for disaggregated ET program student success metrics.

As illustrated in the table below, the department averages for course completion (86%) and course success (80%) are comparatively higher than the department average for persistence to the next term (63%). Additionally, the ET average for course success is comparable to DVC's 81% for 2020-2021 (see Calpass Plus Launchboard Metrics). However, in regard to persistence, the ET Department average of 63% is notably lower than the 71% rate for the College.

Ethnicity	Completion Rate	Success Rate	Persisted Next Term Rate
African-American	76%	67%	59%
American Indian	94%	94%	58%
Asian	89%	83%	65%
Filipino	85%	78%	68%
Hispanic	81%	73%	66%
Multi-Ethnicity	81%	74%	61%
Other/Undeclared	91%	84%	64%
Pacific Islander	95%	90%	60%
White/Non-Hispanic	87%	78%	65%
ET Department Average	**86%**	**80%**	**63%**

As both the table above and the bar chart below illustrate, equity gaps are also notable, as evidenced by comparatively lower rates for African American students across all metrics, and for Hispanic, Filipino, and Multi-ethnic students in respect to success and persistence rates.



Course Completion, Course Success, and Persistence to Next Term by Gender

Females are the majority of the DVC student population (51.9%) but they represent a relatively small number of students in ET programs – a pattern which is typical in higher education STEM programs and many career education related disciplines. For comparative purposes, course success rates among male and female students at DVC are similar (81% for women, 80% for men) but lower for non-binary identifying students (67%). The table below provides a summary by gender of headcount, completion, success, and persistence by ET discipline. Programs that exceed the ET Department averages for completion, success, and persistence by gender are highlighted in green.

DEPARTMENT	GENDER	Headcount	Completion Rate	Success Rate	Persisted Next Term Rate
ARCHI	Female	720	84%	78%	63%
	Male	1077	85%	77%	66%
	Unknown	40	91%	87%	64%
CONST	Female	198	91%	84%	51%
	Male	702	88%	75%	49%
	Unknown	10	90%	70%	50%
ELECT	Female	36	81%	69%	37%
	Male	432	84%	72%	53%
	Unknown	5	71%	71%	33%
ELTRN	Female	15	72%	56%	55%
	Male	196	71%	56%	60%
	Unknown	3	50%	50%	33%
ENGIN	Female	473	86%	78%	62%
	Male	1546	85%	76%	62%
	Unknown	29	89%	78%	63%
ENGTC	Female	105	87%	77%	55%
	Male	452	87%	79%	57%
	Unknown	8	100%	100%	71%
ENSYS	Female	9	83%	67%	63%
	Male	43	81%	74%	47%
	Unknown	2	50%	50%	25%
IDSGN	Female	46	73%	67%	67%
	Male	143	84%	80%	66%
	Unknown	3	100%	86%	86%

ET Program Awards Summary

Key Highlights:

- substantial increase 2015-2016 to 2020-2021;

- steady increases to the highest year prior to pandemic (2018-2019) reflects capacity for increased completions;

- highest number of awards ARCHI AS (n. 98);

- second highest number of awards ENGIN AS (n. 77);

- ENSYS – lowest number; assume discontinued program based on enrollment data.

Key Planning Questions:

- Do departments have plans to decrease number of units to completion? If so, what are the implications for course scheduling?

- Are there plans for braided/integrated student support services? Different/upgraded technology?

Awards

The ***Vision for Success*** goals call for:

- an increase by at least 20 percent (over five years) in the number of California Community College students annually who acquire associate degrees, credentials, certificates, or specific skill sets that prepare them for an in-demand job;

- a decrease in the average number of units accumulated by California Community College students earning associate degrees (i.e., decrease from approximately 87 total units - system-wide average - to 79 total units); and,

- reducing equity gaps with the goal of cutting achievement gaps by 40 percent within 5 years and fully closing those achievement gaps within 10 years.

[Source: CCCCO-Vision-for-Success-Goals-and-Commitments]

In light of these goals and the associated fiscal implications for the Student-Centered Funding Formula (SCFF), an examination of disaggregated data for degree and certificate awards for ET programs of study is an important feature for this portfolio of findings.

PROGRAM	TYPE	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	TOTAL
ARCHI	AS	8	17	10	22	19	22	98
	CA	1	0	0	4	22	10	37
CONST	AS	1	5	7	11	8	9	41
	CA	1	12	11	27	6	5	62
	CC	0	0	9	9	2	2	22
ELECT	AS	11	13	17	6	12	4	63
	CA	6	13	29	5	6	2	61
	CC	1	17	7	5	2	4	36
ENGIN	AS	4	5	14	19	15	20	77
ENGTC	AS	3	1	2	6	5	4	21
	CA	1	1	1	0	1	1	5
	CC	4	1	8	2	5	2	22
ENSYS	CC	1	0	0	0	0	0	1
IDESGN	AS	0	0	2	4	3	2	11
	CA	0	0	1	1	0	1	3
ET TOTALS		42	85	118	121	106	88	560

Awards by Ethnicity (Six Year Period: 2015-2016 through 2020-2021)

Ethnicity	Six Year Total (n.)	Percent
African American	40	7%
Asian	47	8%
Filipino	39	7%
Hispanic	162	29%
Multi-racial	47	8%
Pacific Islander	3	1%
Undeclared	31	6%
White	191	34%

Key Highlights and Planning Questions

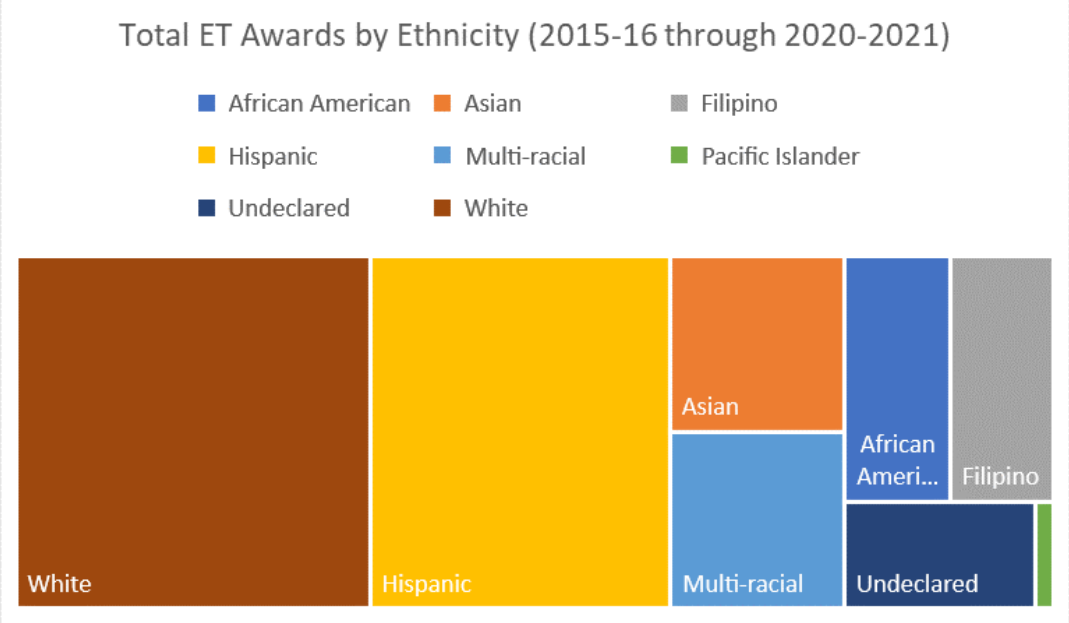
Key Highlights:

- The number and percent of awards generally parallel DVC's student population demographics.

Questions:

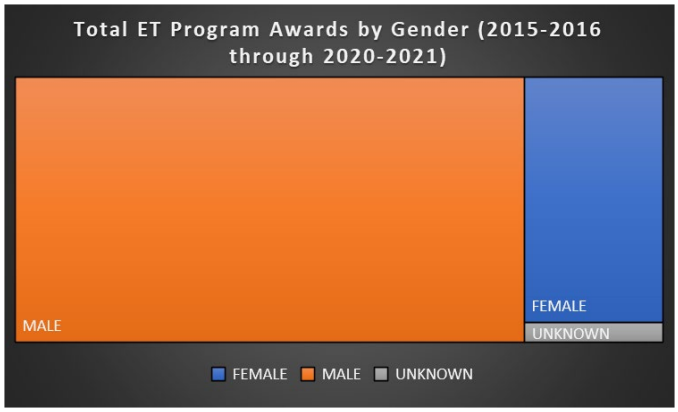
- Are there any plans to increase outreach and support for diverse students and increase completion rates for students of color in ET programs?

- If so, what are the implications for instruction, student services, technology, facilities?



Awards by Gender (Six-Year Period: 2015-2016 through 2020-2021)

GENDER	AWARDS	PERCENT
Female	111	20%
Male	439	79%
Unknown	9	2%



Key Highlights and Planning Questions

Highlights

- The number of awards in ET disciplines increased overall among both males and females but decreased slightly for students of "unknown" genders.
- Females are the majority of the DVC student population (51.9%) but they represent 20% of awards, which is a typical pattern in STEM disciplines.
- The number and percentage of awards to female students increased over a six-year period (7 in 2015-2016; 23 in 2020-2021), which is particularly notable given the disproportionate impact of the pandemic on women in general and among female college students.

Planning Questions

- Are there any plans to increase gender diversity completion rates for under-represented student populations in ET programs?
- If so, what are the implications for instruction, student services, technology, facilities?

Average Units to Completion

As the table below illustrates, the average number of units to program completion in ET disciplines exceeds the Vision for Success goal of 79 units for AA/AS degrees and several programs have seen notable increases in the average units to completion.

ET Program	Award	Average Units to Completion 2015-2016	Average Units to Completion 2020-2021	Percent Change
ARCHI	Degrees	88	105	19%
	Certificates	81	110	36%
CONST	Degrees	107	90	-16%
	Certificates	98	56	-43%
ELECT	Degrees	84	87	4%
	Certificates	35	74	111%
ENGIN	Degrees	100	103	3%
	Certificates	NA	NA	NA
ENGTC	Degrees	64	102	59%
	Certificates	101	65	-36%
ENSYS	Degrees	153	168	10%
	Certificates	28	29	4%
IDESGN	Degrees	124	79	-36%
	Certificates	55	111	102%

Key Labor Market Information

Labor market trends for ET related disciplines are critical to understanding future program demand. The LMI analysis conducted for this environmental scan focused on projections for future job openings in occupations that provide living wages in Contra Costa County. Thus, the occupations identified for this assessment are ones that meet the *MIT Living Wage Calculator* benchmark estimates for salaries in Contra Costa County, which offer a local wage rate that allows residents to meet minimum standards of living. There are several limitations to this tool; namely, data is currently 2019, and therefore, does not account for recent inflation or up-to-date changes in the consumer price index. However, given the critical importance of aligning programs of study to jobs that provide living wages, the *MIT Living Wage Calculator* does help colleges establish baseline indicators for both short and long-range planning.

Several basic assumptions inform the reference point for living-wage occupations in Contra Costa County:

1. Because living-wage calculations are calibrated to household size and the average number of persons per household in the County is 2.86 and 70% are family households, the living wage thresholds are based upon a three-person household.
2. Since the relatively high cost of living in the East Bay region requires more than a single income, the operating assumption applied for the occupational focus is two (2) adults - both working and one child: $26.28/hour or $53,045 annually given 2,020 FT payroll hours per calendar year.

Additionally, two industry sectors most closely align with the programs of study in the Engineering Technology Department: 1) Advanced Manufacturing, and 2) Energy, Construction, Utilities.

Thus, the LMI occupational demand analysis is predicated on the following combination of factors:

- California Employment Development Department Long-Range occupational forecasts (2018-2028) for the Oakland-Hayward-Berkeley Metropolitan District;
- Advanced Manufacturing and Energy, Construction, Utilities sectors;
- entry level education of AA/AS or Post-secondary/Non-degree Award (i.e., "certificate"), or bachelor's degree; and,
- annual average earnings above $53,045.

Notably, as the data tables below reflect, a number of ET programs of study prepare students to enter occupations, which, based on the most current estimates, will provide degree and certificate award-earners as well as transfer students with living wages for the Bay Area. Occupational titles that do not correlate to ET programs have been omitted from the data tables.

Advanced Manufacturing Sector

AA/AS/Post-Secondary Nondegree

Occupational Title	Entry Level Education	2018 Jobs	2018-2028 Total Job Openings	Annual Job Openings	Average Annual Earnings
Mechanical Drafters	Associate's degree	390	420	42	$69,422
Drafters, All Other	Associate's degree	180	200	20	$69,822
Electrical and Electronics Engineering Technicians	Associate's degree	2,280	2,620	262	$68,056
Electro-Mechanical Technicians	Associate's degree	130	150	15	$61,589
Industrial Engineering Technicians	Associate's degree	370	460	46	$58,408
Mechanical Engineering Technicians	Associate's degree	280	300	30	$64,200
Engineering Technicians, Except Drafters, All Other	Associate's degree	940	1,060	106	$72,828
Electrical and Electronics Repairers, Commercial and Industrial Equipment	Postsecondary non-degree award	410	370	37	$70,342
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	Postsecondary non-degree award	140	210	21	$86,047
Tool and Die Makers	Postsecondary non-degree award	210	290	29	$74,469

Source: Employment estimates (current and projected); California Employment Development Department, Labor Market Information Division, Long-term Occupational Projections for Oakland-Hayward-Berkeley Metropolitan District, 2018-2028. Online at www.labormarketinfo.edd.ca.gov.

Bachelor's Degree

Occupational Title	Entry Level Education	2018 Jobs	2018-2028 Total Job Openings	Annual Job Openings	Average Annual Earnings
Industrial Production Managers	Bachelor's degree	1,650	1,410	141	$137,792
Chemical Engineers	Bachelor's degree	280	190	19	$110,405
Electrical Engineers	Bachelor's degree	2,400	1,940	194	$118,858
Electronics Engineers, Except Computer	Bachelor's degree	1,780	1,320	132	$112,951
Industrial Engineers	Bachelor's degree	1,490	1,580	158	$116,693
Materials Engineers	Bachelor's degree	290	230	23	$143,078
Mechanical Engineers	Bachelor's degree	2,080	1,820	182	$124,539

Source: Employment estimates (current and projected); California Employment Development Department, Labor Market Information Division, Long-term Occupational Projections for Oakland-Hayward-Berkeley Metropolitan District, 2018-2028. Online at www.labormarketinfo.edd.ca.gov.

Energy, Construction, Utilities Sector

AA/AS/Post-Secondary Nondegree

Occupational Title	Entry Level Education	2018 Jobs	2018-2028 Total Job Openings	Annual Job Openings	Average Annual Earnings
Architectural and Civil Drafters	Associate's degree	1,320	1,350	135	$66,589
Electrical and Electronics Drafters	Associate's degree	340	380	38	$66,089
Civil Engineering Technicians	Associate's degree	750	750	75	$76,792

Source: Employment estimates (current and projected); California Employment Development Department, Labor Market Information Division, Long-term Occupational Projections for Oakland-Hayward-Berkeley Metropolitan District, 2018-2028. Online at www.labormarketinfo.edd.ca.gov.

Bachelor's Degree

Occupational Title	Entry Level Education	2018 Jobs	2018-2028 Total Job Openings	Annual Job Openings	Average Annual Earnings
Construction Managers	Bachelor's degree	5,070	4,070	407	$129,695
Architectural and Engineering Managers	Bachelor's degree	3,410	2,830	283	$190,208
Architects, Except Landscape and Naval	Bachelor's degree	1,220	1,070	107	$120,286
Surveyors	Bachelor's degree	540	400	40	$92,141
Engineers, All Other	Bachelor's degree	2,670	2,150	215	$111,367

Source: Employment estimates (current and projected); California Employment Development Department, Labor Market Information Division, Long-term Occupational Projections for Oakland-Hayward-Berkeley Metropolitan District, 2018-2028. Online at www.labormarketinfo.edd.ca.gov.

Environmental Scan Conclusions

Engineering Technology programs have proven to be relatively resilient in the face of unprecedented changes, such as system-wide mandates and requirements as well as the COVID-19 pandemic. Notably:

- ✓ *Headcount enrollment (unduplicated) decreased in a number of programs over the previous five academic years, which impacted the number of sections, WSCH, and FTES/FTEF.*
- ✓ *Course completion and course success rates have remained relatively stable; however, rates for persistence-to-next-term for the ET disciplines (average of 63%) are notably lower than the 71% rate for the College.*
- ✓ *The number of degree and certificate awards for ET programs steadily increased over a six-year period. However, the average units-to-completion of degrees remains relatively high, and for several programs, the average has increased; thus, should programs begin*

to address this with curriculum modifications there will likely be implications for course scheduling and enrollment data.

- ✓ *Equity gaps persist across all metrics, which points to the need to consider ways to improve access to programs and support services for diverse student populations and develop facilities and technologies that enhance inclusiveness and belonging for historically-marginalized people of color.*
- ✓ *ET programs of study continue to align with regional labor market demand and a significant number of ET disciplines prepare students to directly enter living-wage occupations in the East Bay Area and to transfer to four-year colleges and universities for degrees that lead to relatively high-wage employment.*

In respect to anticipated program growth, absent enrollment targets for ET programs (established in college-wide enrollment management plan) or educational master plan projections by discipline, several factors should be considered in forecasting future enrollments for facility space planning purposes: broader enrollment patterns in California, nationwide, and locally, labor market demand, and discipline WSCH trends.

- **Broad Enrollment Patterns**
  - As students and families question the value proposition of a college education in light of rising costs and the burden of loan debt, college enrollments across the nation have been declining. Community college enrollments have been declining since 2010 by an average of 2.2% per year– a pattern that the COVID-19 pandemic accelerated. (See AACC: Community College Enrollment Crisis? Historical Trends in Community College Enrollment).
  - DVC has experienced a decrease in student headcount over the past decade from 30,077 in AY2011-2022 to 25,253 in AY2021-2022 – a 16% decline or 1.6% annual average decrease.
- **Labor Market Demand**
  - As delineated in the section above describing labor market trends, forecasted occupational demand in ET-related discipline areas is strong. Thus, with targeted outreach to both the high school student population and working adults, conceivably, ET programs can expect future growth.
- **Discipline WSCH Trends**
  - Two disciplines – ELTRN and ARCHI - have seen the most notable increases in WSCH over the previous four years, which serves as one indicator of future demand and program growth.

ET Program Review Topics and Themes

ET programs completed program reviews in 2021. Captured here are the topics and themes from these most recent program evaluations, which are noted in multiple disciplines' reviews.

SPACE TYPES BY FUNCTION OR PURPOSE

- ✓ dedicated drop-in computer lab space
- ✓ display spaces
- ✓ makerspace
- ✓ flexible shared spaces
- ✓ fabrication space
- ✓ studio spaces
- ✓ project storage areas
- ✓ controlled storage for materials, tools, parts
- ✓ spaces to accommodate large equipment
- ✓ restroom facilities
- ✓ integrated project space
- ✓ integrated lecture and lab space

SPATIAL FEATURES OR CHARACTERISTICS

- ✓ spaces to support interdisciplinary and cross-collaboration
- ✓ room function and adjacency considerations related to noise
- ✓ furniture – seating, worktables, desks
- ✓ proper ventilation
- ✓ light
- ✓ spaces to support range of activities (e.g., seminar/small group workspaces, didactic and interactive learning)
- ✓ spaces to support range of faculty functions and activities (e.g., teaching, research, mentoring, and student advising)
- ✓ state-of-the-art audio-visual technology
- ✓ code and safety compliance

ET Building Remodel Industry and Transfer Partners Survey Themes

Common themes from surveys administered to industry and transfer institution partners indicated a need for DVC's ET programs to continue to build upon the following knowledge, skills, abilities, and resources for current and future students:

- ✓ ***communication skills (oral, written)***
- ✓ ***reading and math skills***
- ✓ ***collaboration/teaming skills***
- ✓ ***diversity and inclusion***
- ✓ ***soft skills***
- ✓ ***hands-on/practical knowledge -> apprenticeships, internships***
- ✓ ***analysis/critical thinking/problem-solving skills***
- ✓ ***design skills***
- ✓ ***fabrication***
- ✓ ***makerspaces***
- ✓ ***technology/programming/graphics skills***
- ✓ ***flexibility (both space, function, interpersonal)***

ET Faculty Focus Groups and Themes

A critical component of the Phase 1 environmental scan included four focus groups with ET discipline faculty, which were conducted via Zoom in July 2022 with the following groups:

- Architecture and Construction/pre-Apprenticeship
- Electrical Technology, Engineering Technology and Industrial Design
- Engineering, M&E Interest Area Staff and Liaisons

Rather than conferring on specific building design elements, square footage, or other construction related issues, these sessions were focused on exploring current and emerging trends and the implications for student-centered, equity-infused learning and teaching environments. General lines of inquiry centered upon the following planning concepts:

Investigating Program Needs

- *How can we best understand the current and future (optimal) program mix in the Engineering Technology building?*
- *How can we best ensure that the buildings constructed today will continue to support student-centered, equity-infused learning and teaching environments 30 to 40 years in the future?*
- *Student-focused Lines of Inquiry: What do students need in this space and what do the faculty and staff who serve these students need? What activities (i.e., learning and support) take place in this space? What are the current limitations? What will be the future space needs?*

Environmental Scan Information

- *What new instructional approaches, such as "flipped classrooms" and Hy-flex modalities, will impact space needs?*
- *What new programs will the College develop over the next five to ten years and what facilities will be needed to support the delivery of instruction in these programs?*
- *What have industry advisory boards indicated as high priorities for Career Education programs related to Engineering Technology?*
- *What impact will efforts to meet industry demands have on program and space needs?*
- *What noteworthy implications for future technology or facilities have been noted in program reviews?*
- *How will the College address the need for the remote delivery of support services?*

Key Themes and Planning Implications from ET Faculty Focus Groups

Flexible, Collaborative Spaces

- Shared Makerspace; a "destination"
- Mix: Some programs need very specific spaces (e.g., construction) , plus opportunities for shared instructional spaces – efficient, flexible, optimized use of space ideas and enhance collaborations
- Range of office types/configurations ("loud," collaborative spaces as well as quiet spaces)
- Spaces to accommodate a variety of instruction and student support activities, such as:
  - counseling/student services nearby, integrated, or co-located
  - tutoring and instructional support spaces (e.g., Math "outpost")
  - spaces to create prototypes, drawings, and similar projects
  - high demand for computer labs
  - "Outward facing" spaces (e.g., visually accessible classrooms, display/showcasing areas for the full array of ET program activities and outputs)

Diversity, Equity, Inclusion, Access

- Creating welcoming spaces that foster a sense of belonging (e.g., centralized local library, kitchenette/café, indoor and outdoor places to meet, socialize, rest)
- Spaces that reflect and help foster understanding of social justice, ecology, environmental justice, and sustainability
- Consider how diverse student populations (e.g., women, people of color) experience space (e.g., safety with lighting, bathroom configurations/ locations, enclosed spaces)
- Universal design for equitable access

Math and Engineering Center Dialogue Themes

Dialogue with the faculty from DVC's Math and Engineering Center yielded a number of ideas that align with and echo the key concepts that emerged from ET Faculty Focus Groups, including the following principles:

- Integration and Connection to Support Student Success:
    - Connect services for students by integrating more intentionally with ET, such as tutoring spaces for discipline-specific space (ARCHI, ENGIN);
    - Make spaces accessible and welcoming (e.g., consider adjacency of ET classes and the Math and Engineering Center); and,
    - Create more effective signage to help students with wayfinding.

- Adaptable, flexible spaces, to support a range of activities, such as:
    - supplemental instruction;
    - "Q/A" work;
    - quiet study;
    - open studio space;
    - workshop spaces; and,
    - student support area.

- Address Technology Needs:
    - Consider a kiosk for laptop check-out;
    - Ubiquitous, consistent, reliable Wi-Fi; and,
    - accessible abundant power and device charging stations.

Student Focus Groups and Themes

In September 2022, three students with experience in ET programs (both pre- and post-pandemic) and facilities participated in a small focus group to provide input on the student experience and to share their ideas for consideration in the redesign of ET spaces. Areas of inquiry included:

- general impressions and experiences in ET facilities;
- what they currently like about ET spaces;
- what they would change about ET spaces;
- what kind of spaces or space designs students need as they work on projects throughout the semester;
- what would make classroom and/or lab spaces attractive to students;
- favorite locations or facilities on the DVC Campus;
- where on the DVC campus they feel most comfortable, connected, welcome, safe;
- what services or supports would be most helpful to have in or closely located to the ET Building;
- what kinds of spaces are best for collaboration;
- how they see the ET programs in the future - in-person vs. remote/online learning; and,
- comments or suggestions for the ET Building Redesign Committee.

As captured below, a number of major themes emerged from these focus group sessions in respect to features that would optimize the student experience: welcoming, warm, clean, safe, flexible, accessible, and "hands-on."

Welcoming and Warm

- building attractiveness – interiors and exteriors
- no "sterile spaces"
- light - more windows, more natural light, skylights, well-lit hallways and common areas
- connection –
  - display spaces
  - community/social space (inside and outside) – activity hubs where students can visit, share, connect, sit, eat, get coffee and healthy food
  - maximize or enhance features of the natural environment
- color – paint, carpet, flooring
- gender-neutral bathrooms
- accessibility for differently-abled populations

Safety Prioritized

- better egress
    - Classrooms
    - Labs
    - Bathrooms
- well-lit hallways and common areas

Flexible, Accessible, Hands-On Learning

- makerspace – place to "build things" and "build relationships"
- space for semester-long projects
- locking storage for projects, tools, materials, supplies
- large open tables accessible throughout the day (could be connected to makerspace)
- easily accessible and available tools and rooms
- spaces for discipline-specific tutoring or supplemental instruction (e.g., help with more challenging concepts in courses)
- dedicated computer lab with laser printers
- accessible, secure storage for projects, supplies, tools, equipment
- small "store" and/or supply vending machine for supplies
- lending library (books and materials)
- reliable Wi-Fi and power outlets
- rooms to support delivery of "hyflex" instruction ("optimal")

College Site Visits and Observations

To gain insights, ideas, and perspectives for teaching and learning spaces in the region, which support similar programs of study, in September 2022 the DVC ET Project Group visited one university facility (i.e., UC Berkeley) and two community colleges with ET discipline-related facilities (i.e., Cosumnes River College Architecture/Construction and their makerspaces and Sierra College). Tour participants captured their thoughts, observations, ideas, and photographs of these spaces on *Site Observation Forms*, which encapsulate the themes identified below and notably align with the themes from both the Faculty and Student Focus Groups.

Light, Bright, Open

- natural light, sense of openness
- central open, working areas; breakout rooms and offices surrounding
- student projects on display
- open areas suitable for large equipment (e.g., laser cutters), tables with tools, labs with high-end 3D printers, robotics

Accessibility

- equipment "access controlled"
- help and information readily available
- accessible tools (e.g., "Doordash" area where students could have their designs 3D printed by a student worker for low cost); makerspace as a "library of tools"
- tables and workspaces "central"- tools, offices and breakout space
- good signage (plus "feedback" options); Monitors, bulletin boards to share projects, updates, status
- store where students could purchase materials and picked up in the makerspace
- spaces well-organized; areas where tools and additional materials could be stored

Flexibility

- fully open makerspace - tools for laser cutting, 3D printing, wood shop, etc., all in one area
- flexible classrooms with breakout rooms – supports lecture and hands-on work
- instruction space adjacent to makerspace

Welcoming and Warm

- student centered, "unpretentious," comfortable
- kitchenette, food spaces for students
- informal student "hangout areas" within the large spacious facility
- ample sitting and relaxation areas for students and staff

Planning Principles

The driving purpose behind the activities for Phase 1 of the ET Building Redesign was to investigate program needs to inform the development of planning principles upon which to ground the design of ET facilities. Key lines of inquiry for this critical phase of planning, which framed the data analysis as well as the dialogues and supporting activities, included:

1) How can we best understand the current and future(optimal) program mix in the Engineering Technology(ET) Building?
2) How can we best ensure that the buildings constructed today will continue to support student-centered, equity-infused learning and teaching environments 30 to 40 years in the future?
3) Student-focused Lines of Inquiry: What do students need in this space and what do the faculty and staff who serve these students need? What activities (i.e., learning and support) take place in this space? What are the current limitations? What will be the future space needs?

Consequently, the planning principles delineated here (i.e., concise, general criterion of important matters to be considered in space planning and design decisions) are informed by key themes from the environmental scan, focus groups, dialogues, and site visits, which collectively serve to address the three fundamental Phase 1 questions above and which were endorsed by the ET Department at the final Phase 1 Planning Meeting on September 28, 2022.

DVC ET Building Remodel Planning Principles

Equity:

- Warm, welcoming, attractive spaces (indoor/outdoor) that foster a sense of belonging and social connection
- Spaces that reflect and help foster understanding of social justice, ecology, environmental justice, and sustainability
- Spaces that reflect consideration for how diverse student populations (e.g., women, people of color) experience space (e.g., safety, lighting, egress)
- Universal design for equitable access

Centralized, Student-Centered Support and Engagement:

- Need for counseling/student services nearby, integrated, or co-located
- Adjacency to support tutoring & other instructional support activities(e.g., Math "outpost")
- Centralized local library

- Healthy food availability, "kitchenette," cafe (enhance belonging, places to meet, socialize, rest)
- Lending library and/or "store" for supplies
- Additional computer space – "open lab"

Collaboration:

- students and faculty
- cross-disciplinary
- shared makerspace student projects and collaboration; a "destination"

Adaptability, Flexibility and Visibility:

- Some programs need very specific spaces (e.g., construction)
- Shared spaces – efficient, flexible, optimized use of space to enhance collaboration and connection
- Space to create prototypes, drawings, and similar projects
- Accessible, secured storage for a range of different projects, tools, supplies, and equipment
- Range of office and room types/configurations ("loud," collaborative spaces, and quiet spaces)
- "Outward facing," visually accessible spaces
- Reliable, ubiquitous, flexible technology (e.g., hyflex classrooms, power outlets, charging stations, instructional technology)