Mechanical Engineering Technologist & Technician

Submitter's Information

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College	East LA College
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Program Information

Program Name	Mechanical Engineering Technologist & Technician

Program Type(s)	Certificate of Achievement 18+ Semester (27+ Quarter) Units Associate of Science Degree
Certificate Required Units	23
Units of Major Degree	23
Total Units for Degree	60
TOPs Code	Engineering Technology, General (requires Trigonometry) (092400)
Program Goals	Mechanical engineering technologists and technicians help mechanical engineers design, develop, test, and manufacture mechanical devices, including tools, engines, and machines as described in Bureau of Labor Statistics. The program ensures students to obtain knowledge and hands-on experience to become technicians who are able to help analyze, design, and manufacture mechanical devices, to communicate professionally, both orally and in writing, and to work as an effective member on team-based projects. The certificate and/or associate degree will be awarded to students upon successful completion of required courses, whom wish to pursue careers in the fields of mechanical engineering technicians (17-3027*), engineering technicians, except drafters (17-3029*), electro-mechanical technicians (17-3024*), and industrial engineering technicians (17-3026*). *2018 SOC Code One of the integral parts of the program is a Capstone course for the needed Hands-On skills and Strong Workforce Apprenticeship Program (SWAG) to ease the placement and employment of the certificate completers. This Advanced Manufacturing program is funded through the round one of the Strong Workforce Program.

Program Description

The Mechanical Engineering Technologist and Technician program offers knowledge and hands-on experience to become technicians who are able to help analyze, design, and manufacture mechanical devices, to communicate professionally both orally and in writing, and to work on team-based projects.
The Certification of Achievement and/or Associate Degree in Science will be awarded upon successful completion of required courses.

Program Requirements

- Skill Certificate Courses (9 units)
EGD-TEK 102, Engineering Graphics for Technologists with GD&T (Drafting & AutoCAD), 3-unit
EGD-TEK 121, Computer Aided Design - 3D SolidWorks, 2-unit
IND-TEK 103, Technical Writing & Communication, 2-unit
IND-TEK 106, Shop Math, 1-unit
*IND-TEK, Orientation to OSHA Tool & Shop safety, 1-unit
- Certificate of Achievement Core Course (10 units)
EGD-TEK 131, CAD Advance Applications, 1-unit
IND-TEK 105, Print Reading with GD&T, 2-unit
*MIT 202, Manufacturing Processes – Metals, 1.5-unit
*MIT 203, Manufacturing Processes - Non-Metals, 1.5-unit
*MIT 204, Traditional Manufacturing - Lathe, Mills, Welding, Cutting, 2-unit
*ENG-TEK, Capstone Course, 2-unit
- Certificate of Achievement Electives (Choose 2 sequential courses, 4 units)
*ENG-TEK, Digital Manufacturing I, 2-unit
*ENG-TEK, Digital Manufacturing II, 2-unit
*ENG-TEK, Non-Destructive Testing / Inspection (NDI/T), 2-unit, Optional
- Associate of Science Required Courses, 16 Units
*ENG-TEK, Introduction to Engineering Technology, 3-unit
*ENG-TEK, Applied Statics and Materials, 3-unit
*C-ID EET, Basic Electronics & Lab with PLC or LabVIEW 3

C-ID MATH 145 Calculus for Technologists, 3-unit
C-ID PHYS 105 General Physics for Science, 3-unit
General Education Courses, 21 Units
* New Course in Progress

Program Projections

40-45 Local Skill Certificate
30-35 Certification of Achievement
5-10 Associate Degree

Labor Market Information

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Status

Recommended

Los Angeles/Orange County Region Specific Questions

District

Los Angeles Community College District (LACCD)

College

East Los Angeles Community College (ELAC)

CRLC Member

Mercy Yanez

Email

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Phone

323.265.8610

Reason for approval request

New Program

Place of program in college's

Engineering Technology

curriculum/similar program	
Similar programs at other colleges in the Los Angeles and Orange County Region	Pasadena City College Glendale College El Camino College Long Beach City College
Annual Enrollment projects (non-duplicative)	40-45 Local Skill Certificate 30-35 Certificate of Achievement 5-10 Associate Degree
Advisory Minutes	Download 2017 Minutes_ET_Department_Final.pdf (/storage/Los Angeles/Orange County/174-157-409-2017 Minutes_ET_Department_Final.pdf)

Engineering Technology

September 2017

Prepared by the Los Angeles/Orange County Center of Excellence for Labor Market Research

Occupation Codes and Descriptions

Currently, there are five occupations in the standard occupational classification (SOC) system and one emerging occupation related to field of Engineering Technology. The occupation titles and descriptions, as well as reported job titles are included in Exhibit 1.[1]

Exhibit 1 – Occupations, descriptions and sample job titles

SOC/O*NET Code	Title	Description	Sample of Reported Job Titles
17-3011.02	Civil Drafters	Prepare drawings and topographical and relief maps used in civil engineering projects, such as highways, bridges, pipelines, flood control projects, and water and sewerage control systems.	Civil Computer Aided Design Designer, Civil Computer-Aided Design Technician, Civil Drafter, Computer-Aided Design Designer, Computer-Aided Design Operator, Computer-Aided Design Technician, Computer-Aided Drafting and Design Drafter, Drafting Technician, Draftsman, Draftsperson
17-3013	Mechanical Drafters	Prepare detailed working diagrams of machinery and mechanical devices, including dimensions, fastening methods, and other engineering information.	Computer Aided Design Designer, Computer Aided Design Operator, Design Drafter, Designer, Drafter, Drafting Technician, Mechanical

[1] New and emerging occupations (N&E) are incorporated into the O*NET-SOC classification system based on the evolving nature of workforce requirements stemming from changes in technology, society, law, and business practices. Incorporating N&E occupations into the O*NET system makes O*NET information more beneficial and responsive. https://www.onetcenter.org/reports/NewEmerging.html

			Designer, Mechanical Drafter, Product Designer, Project Designer
17-3021	Aerospace Engineering and Operations Technician	Operate, install, calibrate, and maintain integrated computer/communications systems, consoles, simulators, and other data acquisition, test, and measurement instruments and equipment, which are used to launch, track, position, and evaluate air and space vehicles. May record and interpret test data.	Avionics Technician, Avionics Test Technician, Calibration Technician, Communication Technician, Electronics Technician, Engineering Technician, Instrumentation Technician, Spacecraft Systems Engineer, Systems Test Technician, Test Technician
17-3024	Electro-mechanical Technician	Operate, test, maintain, or calibrate unmanned, automated, servo-mechanical, or electromechanical equipment. May operate unmanned submarines, aircraft, or other equipment at worksites, such as oil rigs, deep ocean exploration, or hazardous waste removal. May assist engineers in testing and designing robotics equipment.	Electro-Mechanic, Electro-Mechanical Technician, Electronic Technician, Engineering Technician, Laboratory Technician, Maintenance Technician, Mechanical Technician, Product Test Specialist, Test Technician, Tester
17-3026	Industrial Engineering Technician	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.	Engineering Technician, Industrial Engineering Analyst, Industrial Engineering Technician, Manufacturing Technician, Methods Engineer, Process Documentation and Methods Analyst, Process Engineer, Process Technician, Production Staff Worker, Quality

			Control Engineering Technician
17-3027	Mechanical Engineering Technician	Apply theory and principles of mechanical engineering to modify, develop, test, or calibrate machinery and equipment under direction of engineering staff or physical scientists.	Design Engineer, Designer, Engineering Lab Technician, Engineering Technical Analyst, Engineering Technician, Equipment Engineer, Lab Technician, Mechanical Designer, Process Technician, Research and Development Technician

Source: O*NET Online

Current and Future Employment

In the Los Angeles County, the number of jobs related to Engineering Technology is expected to decrease by 4% over the next five years. There are forecasted to be nearly 600 job opportunities available annually for this group of occupations through 2021 due to replacement need (e.g., retirements). Exhibit 2 contains detailed employment projections data for these occupations.

Exhibit 2 – Five-year projections for Engineering Technology occupations in Los Angeles cffounty

SOC	Occupation	2016 Jobs	2021 Jobs	2016 - 2021 Change	2016 - 2021 % Change	Annual Openings
17-3011	Civil Drafters	4,131	3,958	(173)	(4%)	296
17-3027	Mechanical Engineering Technician	1,260	1,185	(75)	(6%)	81
17-3013	Mechanical Drafters	1,021	958	(63)	(6%)	73
17-3026	Industrial Engineering Technician	983	981	(2)	(0%)	65
17-3021	Aerospace Engineering and Operations Technician	681	628	(53)	(8%)	43
17-3024	Electro-mechanical Technician	300	289	(11)	(4%)	20
	TOTAL	8,376	8,000	(376)	(4%)	578

Source: Economic Modeling Specialists International (EMSI)

Earnings

In Los Angeles County, entry-level average wages for engineering technicians range between $17.79 and $24.04, which are above the MIT Living Wage[2] estimate of $13.08 per hour for a single adult living in Los Angeles County. Industrial engineering technicians have the highest average annual earnings in the region – $71,349 per year, assuming full-time employment.

Exhibit 3 contains hourly wages and annual average earnings for these occupations. Entry-level hourly earnings is represented by the 10th percentile of wages, median hourly earnings is represented by the 50th percentile of wages, and experienced hourly earnings is represented by the 90th percentile of wages, demonstrating various levels of employment.

Exhibit 3 – Earnings for Engineering Technology occupations in Los Angeles county, 2016-2021

SOC	Occupation	Entry-Level Hourly Earnings	Median Hourly Earnings	Experienced Hourly Earnings	Average Annual Earnings
17-3021	Aerospace Engineering and Operations Technician	$24.04	$34.03	$43.33	$69,613
17-3026	Industrial Engineering Technician	$19.89	$33.66	$49.90	$71,349
17-3027	Mechanical Engineering Technician	$19.45	$31.87	$42.41	$64,559
17-3013	Mechanical Drafters	$18.10	$26.07	$42.01	$58,276
17-3011	Civil Drafters	$17.79	$28.51	$42.52	$60,696
17-3024	Electro-mechanical Technician	$15.99	$24.78	$44.62	$56,857

Source: Economic Modeling Specialists International (EMSI)

[2] MIT Living Wage Calculator. http://livingwage.mit.edu/

Employer Job Postings

In this research brief, real-time labor market information is used to provide a more nuanced view of the current job market, as it captures job advertisements for occupations relevant to the field of study. Employer job postings are consulted to understand who is employing workers in the Engineering Technology field, and what they are looking for in potential candidates. To identify job postings related to Engineering Technology, the following keywords/search terms and codes were used: Civil Drafters (17-301.02), Mechanical Drafters (17-3013), Aerospace Engineering and Operations Technician (17-3021), Electro-mechanical Technician (17-3024), Industrial Engineering Technician (17-3026), Mechanical Engineering Technician (17-3027).

Top Occupations

In 2016, there were 1,017 employer postings for Engineering Technology occupations. Over two thirds of the postings (62%) were for Mechanical Drafters (635 job postings). There were 1,009 job postings for the same occupations in 2015, and 544 job postings in 2014.

Exhibit 4 – Top occupations in job postings (n=1,017)

SOC/O*NET Code	Occupation	Job Postings, Full Year 2016
17-3013	Mechanical Drafters	635
17-3011.02	Civil Drafters	148
17-3027	Mechanical Engineering Technician	143
17-3021	Aerospace Engineering and Operations Technician	73
17-3026	Industrial Engineering Technician	10
17-3024	Electro-mechanical Technician	8

Source: Labor Insight/Jobs (Burning Glass)

Top Titles

The top job titles for employers posting ads for Engineering Technology are listed in exhibit 5. Mechanical Designer was mentioned as the job title in 9% of all relevant job postings (93 postings).

Exhibit 5 –Job titles (n=1,017)

Title	Job Postings, Full Year 2016
Mechanical Designer	93
Mechanical Technician	86
Plumbing Designer	56
Mechanical Draughter	42
Test Specialist	33
Drafter	32
Piping Designer	32

Cad Operator	25
Draftsman	23
Cad Designer	18

Source: Labor Insight/Jobs (Burning Glass)

Top Employers

Exhibit 6 lists the major employers hiring professionals in the field of Engineering Technology. Top employers postings job ads included Northrop Grumman, Worleyparsons, AECOM Technology Corporation, Spacex, Kpff Consulting Engineers, Ampam Parks Mechanical Incorporated, California State University, Jacobs Engineering Group Incorporated, and Edison International. The top worksite cities in the region for these occupations were Los Angeles, Torrance, Long Beach, Hawthorne, and Pasadena.

Exhibit 6 – Top employers (n=397)

Employer	Job Postings, Full Year 2016
Northrop Grumman	24
Worleyparsons	14
AECOM Technology Corporation	11
Spacex	9
Kpff Consulting Engineers	7
Ampam Parks Mechanical Incorporated	6
California State University	6
Jacobs Engineering Group Incorporated	6
Edison International	5
Next Page	5

Source: Labor Insight/Jobs (Burning Glass)

Certifications and Skills

Security Clearance is the most sought after certification for this occupation group, and was included on 43% of the postings that specified a certification. Other certifications that were largely present on postings were Leadership in Energy and Environmental Design (LEED) (12% of postings) and Engineering in Training Certification (9%). Job-specific skills desired by employers are AutoCAD, Microsoft Office, Computer Aided Drafting/Design (CAD), Revit, and Microsoft Excel.

Exhibit 7 –Job certifications (n=73) and job skills (n=825)

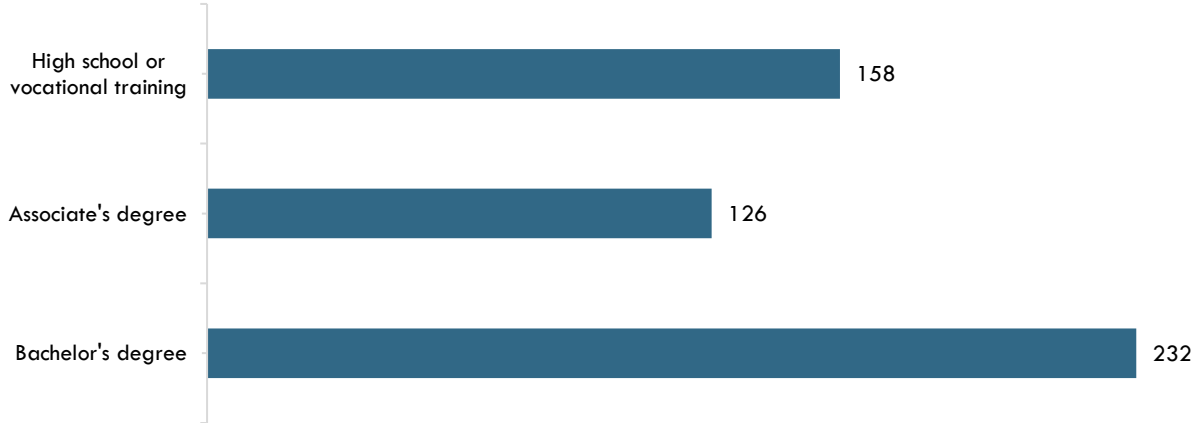
Certification	Job Postings, Full Year 2016	Skills	Job Postings, Full Year 2016
Security Clearance	32	AutoCAD	414
Leadership in Energy and Environmental Design (LEED)	9	Microsoft Office	180
Engineer in Training Certification	7	Computer Aided Drafting/Design (CAD)	171
Computer Aided Design (CAD) Certification	6	Revit	157
Forklift Operator Certification	5	Microsoft Excel	145

Source: Labor Insight/Jobs (Burning Glass)

Advertised Education Levels

Exhibit 8 displays the education level requested by employers in online job ads. The majority of employers were looking for a candidate with Bachelor's degree. Approximately 49% of job postings did not specify a level of education.

Exhibit 8 – 2016 Online job ads with minimum advertised education requirements for Engineering Technology Occupations



Source: Labor Insight/Jobs (Burning Glass)

Industry Concentration

Engineering Technology jobs in Los Angeles County are most often found in the Architectural Services industry (17.4% of total jobs in the industry). Exhibit 9 shows the industries that are the largest employers of Engineering Technology related occupations in Los Angeles County.

Exhibit 9 – Industries with the largest number of Engineering Technology Occupations, 2016

NAICS (6-Digit)	Industry	Occupation Group Jobs in Industry (2016)	% of Occupation Group in Industry (2016)
541310	Architectural Services	1,437	17.4%
541330	Engineering Services	1,390	16.8%
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing	340	4.1%
336411	Aircraft Manufacturing	327	4.0%
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	319	3.9%

Education and Training

Exhibit 10 shows the typical entry-level education requirement for the occupations of interest, along with the typical on-the-job training, and percentage of workers in the field who hold a community college award or have completed some postsecondary courses. Between 55% and 61% of the workforce associated with the Engineering Technology field have completed some community college education as their highest level of education.

Exhibit 10 – Education and training requirements 2016-2021

SOC	Occupation	Typical entry-level education	Typical on-the-job training	% of Community College Award Holders or Some Postsecondary Coursework
17-3011	Civil Drafters	Associate degree	None	61%
17-3013	Mechanical Drafters	Associate degree	None	61%
17-3021	Aerospace Engineering and Operations Technician	Associate degree	None	55%

17-3024	Electro-mechanical Technician	Associate degree	None	55%
17-3026	Industrial Engineering Technician	Associate degree	None	55%
17-3027	Mechanical Engineering Technician	Associate degree	None	55%

Source: Economic Modeling Specialists International, Bureau of Labor Statistics Employment Projections (Educational Attainment)

Currently, there are eight community colleges in Los Angeles County that train students in programs related to the field of Engineering Technology. Exhibit 11 displays the headcount and annual average community college awards for each of the colleges training in this field. Headcount is the actual number of students enrolled, regardless of credit hours. It is also important to note that an award is not equivalent to a single person in search of a job opening, since a student may earn more than one award (e.g. an associate degree and a certificate).

Between 2012-2015, the total annual average community college awards conferred was 73 (52 associate degrees and 21 certificates) across 1 program: Engineering Technology, General (0924.00), etc.

Exhibit 11 – CCC Student Awards (by TOP and College)

			2012 – 2015 Annual Average			
TOP Code	**Program**	**College**	**CCC Headcount**	**CCC Associate Degrees**	**CCC Certificates**	**Total Average CC Awards**
0924.00	Engineering Technology, General	Cerritos	100	N/A	20	20
		East LA	N/A	N/A	1	1
		El Camino	240	N/A	N/A	N/A
		Glendale	90	N/A	N/A	N/A
		LA Harbor	60	N/A	N/A	N/A
		La Valley	82	N/A	N/A	N/A
		Pasadena	98	52	N/A	52
		Rio Hondo	8	N/A	N/A	N/A
		TOTAL	**678**	**52**	**21**	**73**

Source: California Community Colleges Chancellor's Office MIS Data Mart

Student Outcomes

The CTE LaunchBoard provides student outcome data on the effectiveness of CTE programs. The following student outcome information was collected from exiters of the Engineering Technology, General Taxonomy of Program (TOP) code (0924.00) in Los Angeles County for the 2013-14 academic year.

- The median annual wage after program completion is $38,821
- 63% of students are earning a living wage
- 59% of students are employed within six months after completing a program

Source: CTE LaunchBoard

Program Recommendation

This report was compiled by the Los Angeles/Orange County Center of Excellence to provide regional labor market data for the program recommendation of Engineering Technology. This report is to help determine whether there is demand in the local labor market that is not being met by the supply from programs of study (CCC and non-CCC) that align with this occupation group.

Based on the data, the COE has determined there is a need for engineering technology programs in the Los Angeles County region. Reasons include:

- There are 578 annual openings in the region for engineering technology occupations.
- On average, 73 awards (associates and certificates) are conferred each year, signaling there is enough job opportunities for graduates.
- Although the majority of employers were looking for a candidate with a Bachelor's degree, over half of the workforce have completed some community college education as their highest level of education.

Sources

O*Net Online, Labor Insight/Jobs (Burning Glass), Economic Modeling Specialists International (EMSI), MIT Living Wage Calculator, Bureau of Labor Statistics (BLS) Education Attainment, California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart, CTE LaunchBoard, Statewide CTE Outcomes Survey, Employment Development Department Unemployment Insurance Dataset

Lori Sanchez, Director

Center of Excellence, Los Angeles/Orange County

Notes

Data included in this analysis represents the labor market demand for positions most closely related to engineering technology. Standard occupational classification (SOC) codes were chosen based on the national education level required for employment (associate degree and postsecondary certificate) as well as the proportion of current workers who hold a community college award or have had some community college training. This selection process narrows the labor market analysis to the most relevant employment opportunities for students with community college education and/or training.

Traditional labor market information was used to show current and projected employment based on data trends, as well as annual average awards granted by regional community colleges. Real-time labor market information captures job post advertisements for occupations relevant to the field of study and should not be used to establish current job openings, because the numbers may include duplicate job postings or postings intended to gather a pool of applicants. Real-time labor market information can signal demand and show what employers are looking for in potential employees, but is not a perfect measure of the quantity of open positions.

Engineering Technicians

August 2017

Prepared by the South Central Coast Region Center of Excellence for Labor Market Research

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Occupation Codes and Descriptions

Currently, there are six occupations in the standard occupational classification (SOC) system related to the study of engineering technicians. The occupation titles and descriptions, as well as reported job titles are included in Exhibit 1.

Exhibit 1 – Occupations, descriptions and sample job titles

SOC Code	Title	Description	Sample of Reported Job Titles
17-3021	Aerospace Engineering and Operations Technicians	Operate, install, calibrate, and maintain integrated computer/communications systems, consoles, simulators, and other data acquisition, test, and measurement instruments and equipment, which are used to launch, track, position, and evaluate air and space vehicles. May record and interpret test data.	Avionics Technician, Avionics Test Technician, Calibration Technician, Communication Technician, Electronics Technician, Engineering Technician, Instrumentation Technician, Spacecraft Systems Engineer, Systems Test Technician, Test Technician
17-3022	Civil Engineering Technicians	Apply theory and principles of civil engineering in planning, designing, and overseeing construction and maintenance of structures and facilities under the direction of engineering staff or physical scientists.	Civil Designer, Civil Engineering Assistant, Civil Engineering Designer, Civil Engineering Technician, Design Technician, Engineer Technician, Engineering Assistant, Engineering Specialist, Engineering Technician, Transportation Engineering Technician
17-3023	Electrical and Electronics Engineering Technicians	Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, calibrate, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions.	Digital Technician, Electrical Technician, Electronics Engineering Technician, Electronics Technician, Engineering Technician, Failure Analysis Technician, Generation Technician, Instrument and Controls Technician, Refurbish Technician, Relay Tester, Senior Electronics Technician, Technician, Test Technician

17-3024	Electro-Mechanical Technicians	Operate, test, maintain, or calibrate unmanned, automated, servo-mechanical, or electromechanical equipment. May operate unmanned submarines, aircraft, or other equipment at worksites, such as oil rigs, deep ocean exploration, or hazardous waste removal. May assist engineers in testing and designing robotics equipment.	Electro-Mechanic, Electro-Mechanical Technician (E/M Technician), Electronic Technician, Engineering Technician, Laboratory Technician (Lab Technician), Maintenance Technician, Mechanical Technician, Product Test Specialist, Test Technician, Tester
17-3026	Industrial Engineering Technicians	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.	Engineering Technician, Industrial Engineering Analyst, Industrial Engineering Technician, Manufacturing Technician, Methods Engineer, Process Documentation and Methods Analyst, Process Engineer, Process Technician, Production Staff Worker, Quality Control Engineering Technician (QC Engineering Technician)
17-3027	Mechanical Engineering Technicians	Apply theory and principles of mechanical engineering to modify, develop, test, or calibrate machinery and equipment under direction of engineering staff or physical scientists.	Design Engineer, Designer, Engineering Lab Technician, Engineering Technical Analyst, Engineering Technician, Equipment Engineer, Lab Technician, Mechanical Designer, Process Technician, Research and Development Technician

Source: O*NET Online

Current and Future Employment

In the South Central Coast Region[1], the number of engineering technicians is expected to decrease by 3% over the next five years. More than 70 job opportunities will be available annually for engineering technicians through 2021 due to replacement needs (e.g., retirements). Exhibit 2 contains detailed employment projections data for these occupations.

Exhibit 2 – Five-year projections for Engineering Technicians in the South Central Coast Region

SOC	Occupation	2016 Jobs	2021 Jobs	2016 - 2021 Change	2016 - 2021 % Change	Annual Openings
17-3021	Aerospace Engineering and Operations Technicians	124	125	1	1%	4
17-3022	Civil Engineering Technicians	460	458	(2)	(0%)	12
17-3023	Electrical and Electronics Engineering Technicians	1,454	1,374	(80)	(6%)	38
17-3024	Electro-Mechanical Technicians	107	104	(3)	(3%)	3
17-3026	Industrial Engineering Technicians	173	183	10	6%	7
17-3027	Mechanical Engineering Technicians	338	332	(6)	(2%)	10
		2,656	**2,576**	**(80)**	**(3%)**	**75**

Source: Economic Modeling Specialists International (EMSI)

[1] The South Central Coast Region consists of San Luis Obispo County, Santa Barbara County, Ventura County, and the following cities from North Los Angeles County: Canyon Country, Castaic, Lake Hughes, Lancaster, Littlerock, Llano, Newhall, Palmdale, Pearblossom, Santa Clarita, Stevenson Ranch, and Valencia.

Earnings

The average entry-level earnings for the cluster of occupations studied below is $18.29 per hour, which is above the MIT Living Wage[2] estimate for a single adult in the counties that make up the South Central Coast Region:

- Los Angeles County living wage: $13.08/hour
- San Luis Obispo County living wage: $12.54/hour
- Santa Barbara County living wage: $13.85/hour
- Ventura County living wage: $13.39/hour

Exhibit 3 contains hourly wages and annual average earnings for engineering technicians. Entry-level hourly earnings is represented by the 10th percentile of wages, median hourly earnings is represented by the 50th percentile of wages, and experienced hourly earnings is represented by the 90th percentile of wages, demonstrating various levels of employment.

Exhibit 3 – Earnings for Engineering Technicians in the South Central Coast Region, 2016-2021

SOC	Occupation	Entry-Level Hourly Earnings	Median Hourly Earnings	Experienced Hourly Earnings	Average Annual Earnings
17-3021	Aerospace Engineering and Operations Technicians	$24.73	$36.43	$50.18	$76,380
17-3022	Civil Engineering Technicians	$19.93	$32.51	$43.47	$66,070
17-3023	Electrical and Electronics Engineering Technicians	$17.87	$31.67	$48.85	$67,222
17-3024	Electro-Mechanical Technicians	$16.69	$25.78	$42.23	$56,978
17-3026	Industrial Engineering Technicians	$18.32	$27.60	$47.91	$63,158
17-3027	Mechanical Engineering Technicians	$16.06	$24.63	$38.19	$53,396
		$18.29	**$30.64**	**$46.29**	**$65,000**

Source: Economic Modeling Specialists International (EMSI)

[2] MIT Living Wage Calculator. http://livingwage.mit.edu/

Employer Job Postings

To identify job postings related to engineering technicians, the following keywords/search terms and occupation codes were used: aerospace engineering and operations technicians (17-3021), civil engineering technicians (17-3022), electrical and electronics engineering technicians (17-3023), electro-mechanical technicians (17-3024), industrial engineering technicians (17-3026), and mechanical engineering technicians (17-3027).

Top Occupations

In 2016, there were 412 employer postings for engineering technicians in the South Central Coast Region. Roughly two-thirds of the postings (67%) were for electronics engineering technicians with 278 postings. There were 522 job postings for engineering technicians in 2015, and 348 job postings in 2014.

Exhibit 4 – Top occupations in job postings (n=412)

SOC Code	Occupation	Job Postings, Full Year 2016
17-3023	Electrical And Electronics Engineering Technicians	279
17-3022	Civil Engineering Technicians	78
17-3027	Mechanical Engineering Technicians	38
17-3024	Electro-Mechanical Technicians	9
17-3021	Aerospace Engineering and Operations Technicians	6
17-3026	Industrial Engineering Technicians	2

Source: Labor Insight/Jobs (Burning Glass)

Top Titles

The top job titles for employers posting ads for engineering technicians are listed in exhibit 5. Test technician is mentioned as the job title in 26% of all relevant job postings (109 postings).

Exhibit 5 –Job titles (n=412)

Title	Job Postings, Full Year 2016
Test Technician	109
Engineering Technician	104
Electronics Technician	78
Mechanical Technician	26
Instrumentation Technician	23

Source: Labor Insight/Jobs (Burning Glass)

Top Employers

Exhibit 6 lists the major employers hiring professionals in the field of engineering technicians. Top employers posting job ads included: JT3, Skyworks Solutions Incorporated, Lockheed Martin Corporation, Alliant Techsystems, and Northrop Grumman. The top worksite cities in the region for these occupations were Camarillo, Oxnard, Goleta, and Thousand Oaks.

Exhibit 6 – Top employers (n=93)

Employer	Job Postings, Full Year 2016
JT3, LLC	14
Skyworks Solutions Incorporated	13
Lockheed Martin Corporation	10
Alliant Techsystems	9
Northrop Grumman	9

Source: Labor Insight/Jobs (Burning Glass)

Top Skills

Job-specific skills desired by employers include test equipment, repair, Microsoft excel, schematic diagrams, oscilloscopes, soldering, inspection, calibration, Microsoft office, and hand tools.

Exhibit 7 –Job skills (n=352)

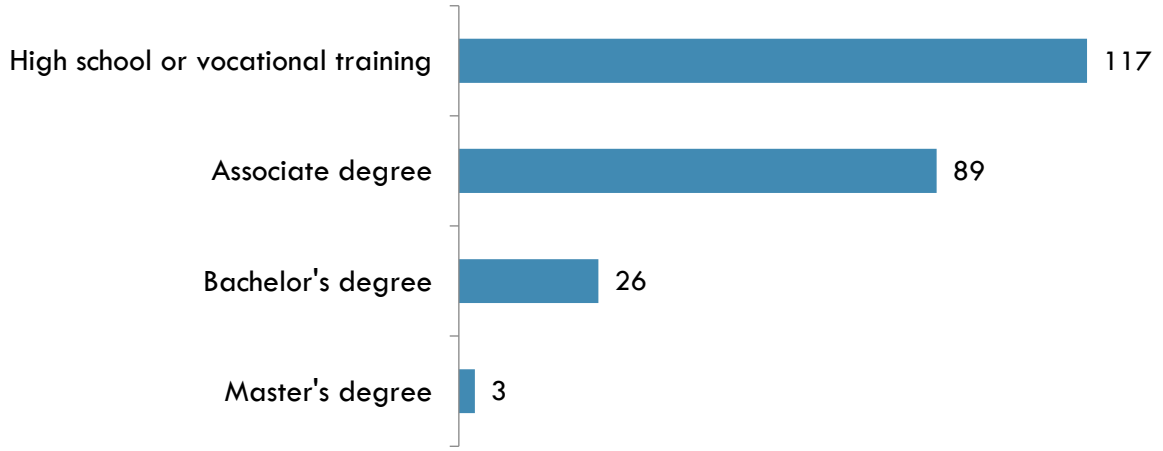
Skills	Job Postings, Full Year 2016	Skills	Job Postings, Full Year 2016
Test Equipment	127	Soldering	76
Repair	122	Inspection	73
Microsoft Excel	81	Calibration	69
Schematic Diagrams	81	Microsoft Office	61
Oscilloscopes	76	Hand Tools	56

Source: Labor Insight/Jobs (Burning Glass)

Advertised Education Levels

Exhibit 8 displays the education level requested by employers in online job ads. The majority of employers were looking for a candidate with at least high school or vocational training. Approximately 43% of job postings did not specify a level of education.

Exhibit 8 – 2016 Online job ads with minimum advertised education requirements for Engineering Technicians (n=235)



Source: Labor Insight/Jobs (Burning Glass)

Industry Concentration

Engineering technician jobs in the South Central Coast Region are most often found in the engineering services industry (16% of total jobs in the industry). Exhibit 9 shows the industries that employ the most engineering technicians in the South Central Coast Region.

Exhibit 9 – Industries employing the most engineering technicians, 2016

NAICS (6-Digit)	Industry	Occupation Group Jobs in Industry (2016)	% of Occupation Group in Industry (2016)
541330	Engineering Services	432	16%
903999	Local Government, Excluding Education and Hospitals	204	8%
334413	Semiconductor and Related Device Manufacturing	185	7%

336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing	135	5%
902999	State Government, Excluding Education and Hospitals	107	4%

Education and Training

Exhibit 10 shows the typical entry-level education requirement for the occupations of interest, along with the typical on-the-job training, and percentage of workers in the field who hold a community college award or have completed some postsecondary courses.

Exhibit 10 – Education and training requirements (2015-2020)

SOC	Occupation	Typical entry-level education	Typical on-the-job training	% of Community College Award Holders or Some Postsecondary Coursework
17-3021	Aerospace Engineering and Operations Technicians	Associate degree	None	55%
17-3022	Civil Engineering Technicians	Associate degree	None	55%
17-3023	Electrical and Electronics Engineering Technicians	Associate degree	None	55%
17-3024	Electro-Mechanical Technicians	Associate degree	None	55%
17-3026	Industrial Engineering Technicians	Associate degree	None	55%
17-3027	Mechanical Engineering Technicians	Associate degree	None	55%

Source: Economic Modeling Specialists International, Bureau of Labor Statistics Employment Projections (Educational Attainment)

Currently, there are seven community colleges in the South Central Coast Region that train students in programs related to the field of engineering technicians. Exhibit 11 displays the headcount and annual average community college awards for each of the colleges training in this field. Headcount is the actual number of students enrolled, regardless of credit hours. It is also important to note that an award is not equivalent to a single person in search of a job opening, since a student may earn more than one award (e.g. an associate degree and a certificate).

Between 2012-2015, the total annual average community college awards conferred was four (three associate degrees and one certificate) across the program: Engineering Technology, General (0924.00).

Exhibit 11 – CCC Student Awards (by TOP and College)

TOP Code	Program	College	2012 – 2015 Annual Average			
			CCC Headcount	CCC Associate Degrees	CCC Certificates	Total Average CC Awards
0924.00	Engineering Technology, General	Allan Hancock	112	1	-	1
		Antelope Valley	2	1	1	2
		Canyons	119	-	-	-
		Cuesta	156	-	-	-
		Moorpark	142	-	-	-
		Santa Barbara	81	-	-	-
		Ventura	-	1	-	1
			612	**3**	**1**	**4**

Source: California Community Colleges Chancellor's Office MIS Data Mart

Student Outcomes

The CTE LaunchBoard provides student outcome data on the effectiveness of the following CTE program. The student outcome information below was collected from exiters of the Engineering Technology, General program (TOP code 0924.00) in the South Central Coast Region for the 2013-2014 academic year:

- 34% of students are earning a living wage
- 53% of students are employed within six months after completing a program

Source: CTE LaunchBoard

Sources

O*Net Online, Labor Insight/Jobs (Burning Glass), Economic Modeling Specialists International (EMSI), MIT Living Wage Calculator, Bureau of Labor Statistics (BLS) Education Attainment, California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart, CTE LaunchBoard, Statewide CTE Outcomes Survey, Employment Development Department Unemployment Insurance Dataset

Lori Sanchez, Interim Director

Center of Excellence, South Central Coast Region

Notes

Data included in this analysis represents the labor market demand for positions most closely related to engineering technicians. Standard occupational classification (SOC) codes were chosen based on the national education level required for employment (associate degree and postsecondary certificate) as well as the proportion of current workers who hold a community college award or have had some community college training. This selection process narrows the labor market analysis to the most relevant employment opportunities for students with community college education and/or training.

Traditional labor market information was used to show current and projected employment based on data trends, as well as annual average awards granted by regional community colleges. Real-time labor market information captures job post advertisements for occupations relevant to the field of study and should not be used to establish current job openings, because the numbers may include duplicate job postings or postings intended to gather a pool of applicants. Real-time labor market information can signal demand and show what employers are looking for in potential employees, but is not a perfect measure of the quantity of open positions.

EAST LOS ANGELES COLLEGE ENGINEERING AND TECHNOLOGIES DEPARTMENT ADVISORY COMMITTEE MEETING

6/7/2017

12:00 PM TO 2:00 PM

Attendance:

University / Industry Representatives Present

1. Mr. Edward Alvarado, East Los Angeles College
2. Mr. John Alvo, Water Engineering & Technical Services LADWP
3. Mr. Mauricio Castillo, California State University, Los Angeles
4. Ms. Gora Datta, IEEE Region 6
5. Mr. Anthony Delgadillo, UPS
6. Mr. Ray Elledge, Verisurf Software Inc.
7. Mr. Kurtis Fukui, UPS
8. Mr. Humberto Gallegos, East Los Angeles College
9. Mr. David Goodreau, SMI/GWI/NTMA
10. Mr. Brian Hagerty, IEEE Region 6
11. Mr. Gerald K. Herder, California State Polytechnic University, Pomona
12. Everardo Hernandez, East Los Angeles College
13. Chris Herwerth, Glendale Community College
14. Mr. Paul Jones, Corporate & University Relations Group
15. Ms. Sandra Ibarra, East Los Angeles College
16. Mr. Stanley Jacobson, East Los Angeles College
17. Mr. Kamy Khashayar, East Los Angeles College
18. Mr. Tom Lazear, Archway System Inc.
19. Mr. Carlos Lopez, Bureau of Engineering Survey Division
20. Mr. Farid Mesghali, East Los Angeles College
21. Mr. Sami Nadjmetchi, VACCO Industries Multi-Fab Products
22. Mr. Harry Panjabi, Rama Enterprises
23. Mr. Rupa Purasinghe, California State University, Los Angeles
24. Ms. Gisele Ragusa, University of Southern California
25. Mr. Jose Ramirez, East Los Angeles College
26. Mr. Joe Rey, Klein Educational Systems
27. Mr. Bradley Roa, Paton Group
28. Mr. Juan Rodriguez, East Los Angeles College
29. MS. Neelam Rozario, Renesco Technical Training
30. Mr. James Sagil, California State University, Fullerton
31. Mr. Roberto Sedano, Water Engineering & Technical Services LADWP
32. Ms. Lynn Shaw, Doing What Matters, California Community Colleges
33. Mr. Brian Vazquez, East Los Angeles College
34. Mr. Eddie Villanueva, East Los Angeles College
35. Mr. Byron Vivar, UPS
36. Nancy Warter-Perez, California State University, Los Angeles
37. Ms. Michelle Yanez, San Gabriel Valley Economic Partnership
38. Mr. Josh Lazear, Archway System Inc.
39. Ms. Mareta Zúñiga, BuildLACCD Program
40. Mr. Eric Guevara, East Los Angeles College

41. Mr. Frank Montelongo, East Los Angeles College
42. Mr. Joshua Bonilla, East Los Angeles College
43. Ms. Maria Gonzalez, East Los Angeles College
44. Ms. Dana Page, East Los Angeles College
45. Mr. Victor Marquez, East Los Angeles College
46. Mr. Chokin Chin, East Los Angeles College
47. Ms. Ashley Orta, East Los Angeles College
48. Mr. Jorge Castillo, East Los Angeles College
49. Mr. James Arredondo, East Los Angeles College
50. Ms. Quennie Inga, East Los Angeles Collge
51. Mr. Antonio Ascencio, East Los Angeles College
52. Ms. Sandra Jaime, East Los Angeles College
53. Ms. Erika Ramirez, East Los Angeles College

Meeting was called to order at 12:15 PM

Welcome Speech from Faculty Department Chair/Professor Jose Ramirez.

a) Welcome everyone to the East Los Angeles College Engineering & Technologies Advisory meeting 2017.

Introduction and review of 2016 Advisory Committee minutes

Call for corrections and noted

a) No corrections were made.

Motion to approve meeting minutes from 2016 Advisory Committee

a) First motion to approve the minutes Gisele Ragusa.
b) Second motion to approve the minutes Tom Lazear.
c) Motion Approved by consent

Presentation on 2016-2017 Department Activities Summary

CCCCO: Doing What Matters Grants
Proposition 39 Clean Energy Jobs Creation Workforce Grant: EET Skills Certificates
Proposition 39 Clean Energy Jobs Creation Workforce Grant: Advance Manufacturing Bootcamp
Lottery Grant & ELAC 100 Budget
Dual Enrollment: Associate Dean Dueñas
ELAC School of Continuing Education: AB104
California Work Opportunity and Responsibility to Kids (CalWORKs)
Perkins Grants
CTE Strong Workforce
Unmanned Aerial Vehicle (UAV) Training Project
Certificates, A.S. Degrees and Transfers

Meeting Presentations

Presentation by Engineering Club members

a) Ms. Dona Marie Page, President of Engineering Club, presents the mission and vision goal for engineering clubs, Engineering students, and future STEM students. Ms. Page speaks on the beneficiaries of Engineering club, Community Outreach Events, and Conferences meetings.
b) Ms. Maria Gonzalez, elaborates on Women Engineers.

Presentation by General Engineering 212

a) General Engineering class members presented their sterling engine FEVO.

Presentation by Dynamics class

a. Dynamic students: Victor Marquez and Chokin Chin presentation on the five stages of energy transfer.

Round Table discussions:

1. Mr. Ramirez provides explanations on the State programs: Engineering Degree and Certifications.
2. Mr. Khashayar discusses advance manufacturing program and the success of the engineering manufacturing Bootcamp which exposes students to general manufacturing. Student completion of the Bootmcamp will receive certification of completion. It is suggested by Mr. Khashayar that manufacturing industry members hire entry level certified manufactures so that individuals go into industry with the will to work.
3. Dr. Gallegos elaborates on Geo-Spatial Engineering and Technologies
4. Mr. David Goodreau suggest that courses/skillsets acquired in class be fully grasp by the student who is applying technical applications. It is also suggested that skillsets aligned to what the engineer wants. In many cases a student might have the experience of computers, however, lacks the experience in software assistance.
5. Ms. Mareta Zúñiga speaks on internship components. It is essential that students introduce themselves to businesses. Ms. Zúñiga also suggests that schools couple internship with some funding or program that provides students with the opportunity to get their foot in the door, to acquire hands-on and work experience.
6. Mr. John Alvo implies that students have an in-depth understanding of the fundamentals, many students go into industry with the expectation of coming into the top; however, all that is require is the basics and the tests to get in the civil service world. It is perceive that graduate students coming from Universities cannot pass the civil service test because they lack the basic fundamentals. It is important that as educators, one prepares their student for tests.
7. Gisele Ragusa speak on volunteer work, she conveys that many students cannot afford to do volunteer work, many students do not qualify for financial support and have to work in order to buy school books and supplies. Ms. Gisele Ragusa suggest that there be a partnership paid internship with colleges and universities.
8. Mr. Kurtis Fukui speaks on job offers provided by UPS. UPS offers level entry positions that teaches candidates the skillsets and the culture of UPS. After 6 months candidates can promote to engineering.

9. Mr. Eric Guevara speaks on internship and announces that students are willing to accept pain or non-paid internships.
10. Rupa Purasinghe Speaks on paid internship.
11. Mr. Brian Hagerty recommends calling the CIS to CS transformation program CECS (Computer Engineering and Computer Science). CECS is more comprehensive than CS.
12. Mr. Ray Elledge, in regards to Quality control Tech and CNC Certification, implies that Quality Control Technician - QTC runs parallel to the CNC program. Mr. Ray Elledge, suggests that the two courses be ducktail or combine with other courses. Other campuses are duck tailing their MasterCAM Lab.
13. Mr. Bradley Roa suggest that classes be modify and integrate with CIS (Computer Intergrade Manufacturing).
14. Mr. Bradley Roa suggested that there be a website update which allows industry members to post internship/job openings for continuing and graduate students.
15. Mr. Brian Hagerty speaks on energy analyses for sustainability.

Motion to approved Department Request

a) First motion Kamy Khashayar
b) Second motion Carlos Lopez
c) Motion Approved

Department Request:

a. **Electronics: IT Technician Pathway**
   I. Certificate of Achievement:
      - Computer Retail Sales and Support (Stage I)
      - Help Desk User Support (Stage II)
      - IT Technician (Stage III)
   II. Associates of Science Degree
      - IT Technician (Stage III)
   III. K5-108E Location for Netlab + Network Servers
   IV. CTE Strong Workforce Grant Proposal
   V. Potential merger of Computer Science discipline from Business Department with Engineering and Technologies Department
   VI. Engineering Instructor Tenure Track for Fall 2018
   VII. Engineering Laboratory Technician
      - Replacement of Electronics Department (Joe Kao)
   VIII. Accreditation Board for Engineering and Technology (ABET)
      - Engineering Technology Accreditation Commission
   IX. Unmanned Autonomous Systems (UAS)
      - Program and course development
      - New Top Code

b. **Guided Pathway Academy**

Courses:

- GE 101 Introduction to Science, Engineering and Technology (UC:CSU) 2 units
- MIT 220 Introduction to Robotics (CSU) 3 Units
- EET 123 Programming with Arduino (CSU) 2 Units
- EGD TEK 101 Engineering Graphics (UC:CSU) 3 Units
- EGD TEK 111 AutoCAD 2D (UC:CSU) 3 Units
- EGD TEK 121 SolidWorks 3D (CSU) 3 Units
- ES 100 Plane Surveying I: Boot Camp for High School Students 2 Units
- ES 101 Plane Surveying II: Boot Camp for High School Students 2 Units (Pending New Course)

c. **Engineering Technology Certificate and Degree programs**

I. Advanced Manufacturing Engineering Technician
   - Computer Aided Manufacturing – CAM in CNC Programming and CNC Operation

II. Mechanical Engineering Technician
   - Computer Aided Design – CAD with 3D printing and Laser Scanning

III. Industrial Engineering Technician
   - Quality Control and Assurance – QA with Coordinate Measuring machine (CMM) and Laser Scanning.

d. **Software/Equipment/Facilities**

Bentley Suite, Suit, SolidWorks, CREO PTC, Mathworks, CAD Plotter,

Cannon Copier, GIS, 3D Printers Maintenance	$35K
IT Pathway: Stage I, II, and III	$1200K
Advanced Manufacturing Equipment	$600K
Reverse Engineering Arms	$3K
Data Collectors for all Total Stations x7	$25K
Reflector less Total Station x5	$30K
GPS-RTK unit x2Each	$80K
Tooling-U	$10K
Accreditation Board for Engineering and Technology (ABET)	$20K
Chairs for E7-101 and E7-302	$10K
Engineering Computers: E7-101	$130K
Unmanned Aerial Vehicles (UAS)	$100K

Meeting called to adjourn at 2:45 PM