Engineering Technology

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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
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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)

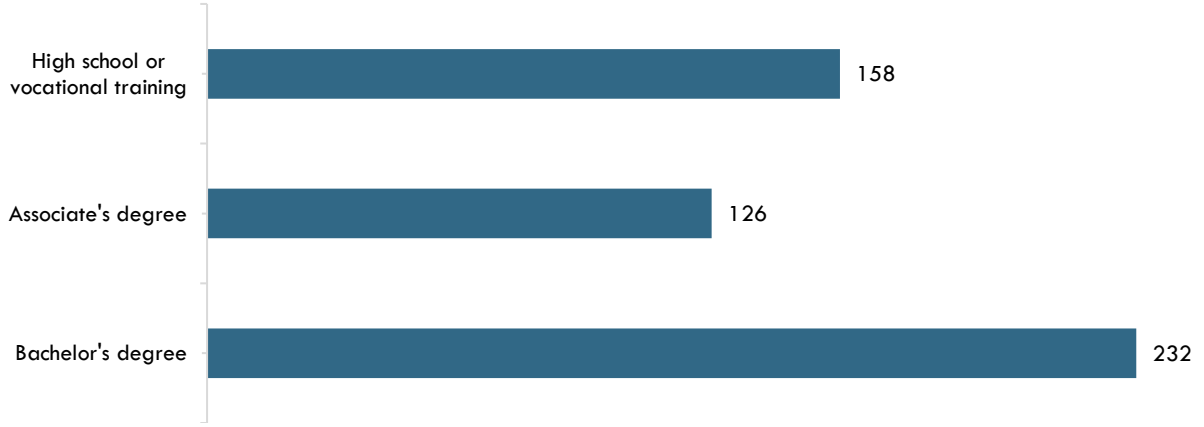
Certification	Job Postings, Full Year 2016	Skills	Job Postings, Full Year 2016
Security Clearance	32	AutoCAD	414
Leadership in Energy and Environmental Design (LEED)	9	Microsoft Office	180
Engineer in Training Certification	7	Computer Aided Drafting/Design (CAD)	171
Computer Aided Design (CAD) Certification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

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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.