

**Program Endorsement Brief: 0999.00/Other Engineering and Related Industrial Technologies  
Advanced Material Nanotechnology**  
Los Angeles/Orange County Center of Excellence, March 2021

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**Summary Analysis**

<b>Program Endorsement:</b>	<b>Endorsed: All Criteria Met</b> <input checked="" type="checkbox"/>	<b>Endorsed: Some Criteria Met</b> <input type="checkbox"/>	<b>Not Endorsed</b> <input type="checkbox"/>
<b>Program Endorsement Criteria</b>			
<b>Supply Gap:</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
<b>Living Wage: (Entry-Level, 25<sup>th</sup>)</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
<b>Education:</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
<b>Emerging Occupation(s)</b>			
Yes <input checked="" type="checkbox"/>		No <input type="checkbox"/>	

The Los Angeles/Orange County Center of Excellence for Labor Market Research (COE) prepared this report to provide Los Angeles/Orange County regional labor market supply and demand data related three middle-skill occupations: *industrial engineering technologists and technicians (17-3026)*; *calibration technologists and technicians and engineering technologists and technicians, except drafters, all other (17-3098)*; and *chemical technicians (19-4031)*. This report also includes one emerging occupation: *quality control analysts (19-4099.01)*. Middle-skill occupations typically require some postsecondary education, but less than a bachelor’s degree.<sup>1</sup> This report is intended to help determine whether there is demand in the local labor market that is not being met by the supply from community college programs that align with the relevant occupations.

Based on the available data, there appears to be a supply gap for these technician occupations related to advanced material nanotechnology in the region. Furthermore, the occupations in this report typically require an associate degree, and entry-level wages exceed the living wage in both Los Angeles and Orange counties. **Therefore, due to all the criteria being met, the COE endorses this proposed program.** Detailed reasons include:

**Demand:**

- **Supply Gap Criteria** – Over the next five years, there is projected to be **1,071 jobs available annually** in the region due to new job growth and replacements, **which is more than the 501 awards conferred annually** by educational institutions in the region.

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<sup>1</sup> The COE classifies middle-skill jobs as the following:

- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor’s degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All occupations that require a high school diploma or equivalent or no formal education, but also require short- to long-term on-the-job training where multiple community colleges have existing programs.

- Nanotechnology is an ever-emerging field that combines science, engineering and technology. Since there are no current standard occupational classification (SOC) codes that track data for technicians solely in the field of nanotechnology, **the number of annual job openings is likely overstated.**
- Over the past 12 months, there were **five online job postings for nanotechnology engineering technicians.**
- **Living Wage Criteria** – Within Los Angeles County, all occupations related to advanced material nanotechnology have **entry-level wages above the county’s living wage** (\$15.04/hour).<sup>2</sup>
- **Educational Criteria** –The Bureau of Labor Statistics (BLS) lists an **associate degree** as the **typical entry-level education for all of the technician occupations in this report.**
  - Furthermore, the national-level educational attainment data indicates **between 34.3% and 50.8% of workers in the field have completed some college or an associate degree.**

#### Supply:

- There are **15 community colleges** in the LA/OC region that issue awards related to the occupations of interest, conferring an average of **323 awards annually** between 2016 and 2019.
- Between 2014 and 2017, there was an average of **178 awards conferred annually** in related training programs by non-community college institutions throughout the region.
  - Similar to disclaimer above for the number of annual job openings being likely overstated for nanotechnology positions, there is no TOP designated specifically for nanotechnology, and no completions reported under the designated CIP code for nanotechnology programs (Nanotechnology – CIP 15.1601). Therefore, **the number of awards specifically related to nanotechnology is also overstated.**

### Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for the four occupations related to advanced material nanotechnology. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 2% through 2024. There will be nearly 1,100 job openings per year through 2024 due to job growth and replacements.

Nanotechnology is an ever-emerging field that combines science, engineering and technology. Since there are no current standard occupational classification (SOC) codes that track data for technicians solely in the field of nanotechnology, demand data in Exhibit 1 is overstated when considering only technicians in the field of advanced material nanotechnology. Recently, data collection has been underway for emerging nanotechnology technician occupations:

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<sup>2</sup> Living wage data was pulled from California Family Needs Calculator on 3/31/2021. For more information, visit the California Family Needs Calculator website: <https://insightcced.org/2018-family-needs-calculator/>.

nanotechnology engineering technicians (17-3029.12), a code which is no longer in use, and nanotechnology engineering technologists and technicians (17-3026.01), the current O\*NET (emerging) code. Since this emerging occupation has recently changed, Exhibit 1 includes data for both 17-3026 and 17-3029, in order to capture all relevant demand data.

*This report includes employment projection data by Emsi, which uses EDD information. Emsi's projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy, during the projection period, will be at approximately full employment. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, it may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Therefore, the projections included in this report do not take the impacts of COVID-19 into account.*

**Exhibit 1: Occupational demand in Los Angeles and Orange Counties<sup>3</sup>**

Geography	2019 Jobs	2024 Jobs	2019-2024 Change	2019-2024 % Change	Annual Openings
Los Angeles	6,535	6,590	56	1%	711
Orange	3,164	3,304	139	4%	360
<b>Total</b>	<b>9,699</b>	<b>9,894</b>	<b>195</b>	<b>2%</b>	<b>1,071</b>

### Wages

The labor market endorsement in this report considers the entry-level hourly wages for the occupations related to advanced material nanotechnology in Los Angeles County as they relate to the county's living wage. Orange County wages are included below in order to provide a complete analysis of the LA/OC region. Detailed wage information, by county, is included in Appendix A.

**Los Angeles County**— All of the occupations of interest have entry-level wages above the living wage for one adult (\$15.04 in Los Angeles County). Typical entry-level hourly wages are in a range between \$17.43 and \$22.93. Experienced workers can expect to earn wages between \$31.74 and \$40.84, which are higher than the living wage estimate.

**Orange County**— All of the occupations of interest have entry-level wages above the living wage for one adult (\$17.36 in Orange County). Typical entry-level hourly wages are in a range between \$17.60 and \$23.84. Experienced workers can expect to earn wages between \$30.63 and \$43.12, which are higher than the living wage estimate.

### Job Postings

There were five online job postings for *nanotechnology engineering technicians* listed in the past 12 months. The title listed on all five job postings was cleanroom technician. The top skills were cleaning, clean room experience, lifting ability, current good manufacturing practices (CGMP),

<sup>3</sup> Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

and packaging. The only two employers listed on job postings were TalentZok and Quality Precision Cleaning.

*It is important to note that the job postings data included in this section reflects online job postings listed in the past 12 months and does not yet demonstrate the impact of COVID-19. While employers have generally posted fewer online job postings since the beginning of the pandemic, the long-term effects are currently unknown.*

### Educational Attainment

The Bureau of Labor Statistics (BLS) lists an associate degree as the typical entry-level education for all four occupations studied in this report. Furthermore, the national-level educational attainment data indicates between 34.3% and 50.8% of workers in the field have completed some college or an associate degree.

### Educational Supply

**Community College Supply**—Exhibit 2 shows the annual and three-year average number of awards conferred by community colleges in the related TOP codes: Engineering Technology, General (requires trigonometry) (0924.00), Industrial Electronics (0934.20), Chemical Technology (0954.00), Manufacturing and Industrial Technology (0956.00), and Other Engineering and Related Industrial Technologies (0999.00). The colleges with the most completions in the region are Pasadena and Coastline. Over the past 12 months, there were no other program recommendation requests for nanotechnology programs from regional community colleges.

**Exhibit 2: Regional community college awards (certificates and degrees), 2016-2019**

TOP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
0924.00	Engineering Technology, General (requires Trigonometry)	Cerritos	6	23	26	18
		East LA	1	-	-	0
		Glendale	12	17	14	14
		Pasadena	122	173	176	157
		<b>LA Subtotal</b>	<b>141</b>	<b>213</b>	<b>216</b>	<b>190</b>
		Santa Ana	5	1	1	2
		<b>OC Subtotal</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>2</b>
<b>Supply Subtotal/Average</b>			<b>146</b>	<b>214</b>	<b>217</b>	<b>192</b>
0934.20	Industrial Electronics	El Camino	-	1	-	0
		<b>LA Subtotal</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>Supply Subtotal/Average</b>			<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
0954.00	Chemical Technology	LA Trade	-	-	8	3
		<b>LA Subtotal</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>3</b>
<b>Supply Subtotal/Average</b>			<b>0</b>	<b>0</b>	<b>8</b>	<b>3</b>
0956.00		Cerritos	3	6	2	4
		Compton	-	2	-	1

TOP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
	Manufacturing and Industrial Technology	El Camino	3	3	2	3
		LA Trade-Tech	-	-	5	2
		LA Valley	4	2	3	3
		Mt San Antonio	19	9	13	14
		<b>LA Subtotal</b>	<b>29</b>	<b>22</b>	<b>25</b>	<b>25</b>
		Fullerton	3	11	9	8
		Irvine	7	1	3	4
		Saddleback	5	9	11	8
		Santa Ana	-	1	-	0
		Santiago Canyon	-	27	41	23
		<b>OC Subtotal</b>	<b>15</b>	<b>49</b>	<b>64</b>	<b>43</b>
<b>Supply Subtotal/Average</b>			<b>44</b>	<b>71</b>	<b>89</b>	<b>68</b>
0999.00	Other Engineering and Related Industrial Technologies	LA Trade	16	17	-	11
		<b>LA Subtotal</b>	<b>16</b>	<b>17</b>	<b>0</b>	<b>11</b>
		Coastline	39	49	57	48
		<b>OC Subtotal</b>	<b>39</b>	<b>49</b>	<b>57</b>	<b>48</b>
<b>Supply Subtotal/Average</b>			<b>55</b>	<b>66</b>	<b>57</b>	<b>59</b>
<b>Supply Total/Average</b>			<b>245</b>	<b>352</b>	<b>371</b>	<b>323</b>

**Non-Community College Supply**—For a comprehensive regional supply analysis, it is important to consider the supply from other institutions in the region that provide training programs for technicians related to advanced material nanotechnology. Exhibit 3 shows the annual and three-year average number of awards conferred by these institutions in the related Classification of Instructional Programs (CIP) Codes: Engineering Technology, General (15.000), Industrial Technology/Technician (15.0612), Manufacturing Engineering Technology/Technician (15.0613), Mechanical Engineering/Mechanical Technology/Technician (15.0805), and Industrial and Product Design (50.0404). Due to different data collection periods, the most recent three-year period of available data is from 2014 to 2017. Between 2014 and 2017, non-community college institutions in the region conferred an average of 178 awards annually in related training programs.

To reiterate, there were no completions reported under the CIP code designated specifically for nanotechnology programs – Nanotechnology, CIP – 15.1601.

**Exhibit 3: Regional non-community college awards, 2014-2017**

<b>CIP Code</b>	<b>Program</b>	<b>College</b>	<b>2014-2015 Awards</b>	<b>2015-2016 Awards</b>	<b>2016-2017 Awards</b>	<b>3-Year Award Average</b>
15.0000	Engineering Technology, General	California State Polytechnic Univ.-Pomona	26	42	11	26
		California State Univ.-Long Beach	1	-	-	0
15.0612	Industrial Technology/Technician	California State Univ.-Los Angeles	34	41	50	42
15.0613	Manufacturing Engineering Technology/Technician	California State Univ.-Long Beach	2	5	2	3
15.0805	Mechanical Engineering/Mechanical Technology/Technician	California State Polytechnic Univ.-Pomona	-	-	41	14
50.0404	Industrial and Product Design	Argosy University-The Art Institute of California-Hollywood	7	8	12	9
		Argosy University-The Art Institute of California-Orange County	20	13	19	17
		California State Univ.-Long Beach	18	21	39	26
		FIDM-Fashion Institute of Design & Merchandising-Los Angeles	-	-	41	14
		Otis College of Art and Design	30	24	28	27
<b>Supply Total/Average</b>			<b>138</b>	<b>154</b>	<b>243</b>	<b>178</b>

**Appendix A: Occupational demand and wage data by county**

**Exhibit 4. Los Angeles County**

<b>Occupation (SOC)</b>	<b>2019 Jobs</b>	<b>2024 Jobs</b>	<b>5-Yr Change</b>	<b>5-Yr % Change</b>	<b>Annual Openings</b>	<b>Entry-Level Hourly Earnings (25<sup>th</sup> Percentile)</b>	<b>Median Hourly Earnings</b>	<b>Experienced Hourly Earnings (75<sup>th</sup> Percentile)</b>
Industrial Engineering Technologists and Technicians (17-3026)	934	920	(14)	(2%)	92	\$22.45	\$29.82	\$40.84
Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other (17-3098)	2,120	2,131	12	1%	214	\$22.93	\$29.53	\$39.59
Chemical Technicians (19-4031)	1,337	1,338	1	0%	136	\$17.43	\$23.06	\$31.74
Life, Physical, and Social Science Technicians, All Other (19-4099)	2,144	2,201	57	3%	269	\$18.82	\$25.60	\$32.13
<b>Total</b>	<b>6,535</b>	<b>6,590</b>	<b>56</b>	<b>1%</b>	<b>711</b>			

**Exhibit 5. Orange County**

<b>Occupation (SOC)</b>	<b>2019 Jobs</b>	<b>2024 Jobs</b>	<b>5-Yr Change</b>	<b>5-Yr % Change</b>	<b>Annual Openings</b>	<b>Entry-Level Hourly Earnings (25<sup>th</sup> Percentile)</b>	<b>Median Hourly Earnings</b>	<b>Experienced Hourly Earnings (75<sup>th</sup> Percentile)</b>
Industrial Engineering Technologists and Technicians (17-3026)	575	590	15	3%	59	575	590	15
Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other (17-3098)	1,089	1,124	34	3%	113	\$23.49	\$29.95	\$39.94
Chemical Technicians (19-4031)	611	637	25	4%	67	\$17.60	\$23.29	\$32.06
Life, Physical, and Social Science Technicians, All Other (19-4099)	889	953	65	7%	121	\$17.96	\$24.41	\$30.63
<b>Total</b>	<b>3,164</b>	<b>3,304</b>	<b>139</b>	<b>4%</b>	<b>360</b>			

### Exhibit 6. Los Angeles and Orange Counties

Occupation (SOC)	2019 Jobs	2024 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Typical Entry-Level Education
Industrial Engineering Technologists and Technicians (17-3026)	1,509	1,509	1	0%	151	Associate degree
Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other (17-3098)	3,209	3,255	46	1%	327	Associate degree
Chemical Technicians (19-4031)	1,948	1,975	27	1%	203	Associate degree
Life, Physical, and Social Science Technicians, All Other (19-4099)	3,033	3,154	121	4%	390	Associate degree
<b>Total</b>	<b>9,699</b>	<b>9,894</b>	<b>195</b>	<b>2%</b>	<b>1,071</b>	

#### Appendix B: Sources

- O\*NET Online
- Labor Insight/Jobs (Burning Glass)
- Economic Modeling Specialists, International (Emsi)
- Bureau of Labor Statistics (BLS)
- Employment Development Department, Labor Market Information Division, OES
- California Community Colleges Chancellor's Office Management Information Systems (MIS)
- California Family Needs Calculator, Insight Center for Community Economic Development
- Chancellor's Office Curriculum Inventory (COCI 2.0)

For more information, please contact:

Luke Meyer, Director  
 Los Angeles/Orange County Center of Excellence  
[lmeyer7@mtsac.edu](mailto:lmeyer7@mtsac.edu)

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