

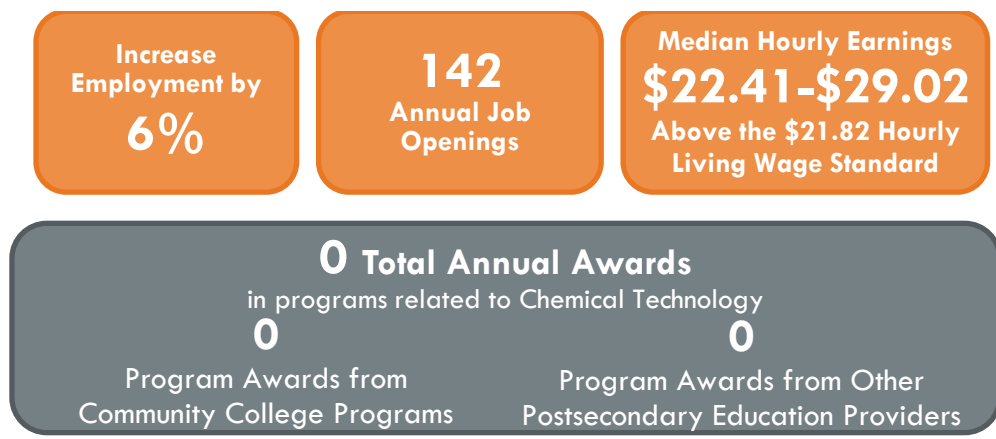
Chemical Technology

Inland Empire/Desert Region (Riverside and San Bernardino counties)

Summary



Over the next five years (2021-2026), employment for the chemical technology occupational group is projected to



The Inland Empire/Desert Centers of Excellence

 **Recommends**

Chemical Technology Program Development
to meet the need for workers in the region

Introduction

California Community College chemical technology programs (TOP 0954.00) prepare students for employment through instruction related to chemical processes, including heat transfer, treatment of liquid and gases, and physical-chemical operations used in industrial processes and the chemical industry (Taxonomy of Programs, 2012). The knowledge, skills, and abilities trained by chemical technology programs lead to employment in the following occupations, further referred to as the chemical technology occupational group:

- Chemical Technicians (SOC 19-4031)
- Chemical Plant and System Operators (51-8091)
- Chemical Equipment Operators and Tenders (51-9011)

Job Counts and Projections

In 2021, there were 1,103 chemical technology jobs in the Inland Empire/Desert Region. Employment for this occupational group is projected to increase by 6% through 2026, with 142 job openings expected annually. Exhibit 1 displays the job counts, projected job growth, job openings, and the share of incumbent workers aged 55 years and older in the region.

Exhibit 1: Five-year projections, Inland Empire/Desert Region, 2021-2026

Occupation	2021 Jobs	2026 Jobs	5-Yr % Change	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Chemical Equipment Operators and Tenders	508	544	7%	309	62	23%
Chemical Technicians	419	450	7%	296	59	26%
Chemical Plant and System Operators	176	181	3%	104	21	29%
Total	1,103	1,175	6%	709	142	25%

Source: Lightcast 2023.1

An online job advertisement (ad) search for the chemical technology occupational group was conducted to reveal the employers seeking these workers, including the median posting duration, earnings information, education and experience requirements, and in-demand skills. Over the previous 12 months, there were 19 job ads posted for the chemical technology occupational group in the region. The job ad search was expanded to include all chemical technology job ads listed over the last 12 months in California to ensure that the job ad information included in this report is reliable and generalizable.

Exhibit 2 shows the number of job ads posted during the last 12 months and the statewide median posting duration. On average, employers in the state had job ads for the chemical technology occupational group open for 29 days. The average statewide online job is open for 28 days, indicating that employers in the state likely face similar challenges filling chemical technology jobs as other jobs. The majority of job ads were for chemical technicians.

Exhibit 2: Job ads and median posting duration, California, April 2022 – March 2023

Occupation	Job Ads	Median Posting Duration (Days)
Chemical Technicians	1,023	29
Chemical Equipment Operators and Tenders	100	29
Chemical Plant and System Operators	0	-
Total	1,123	29

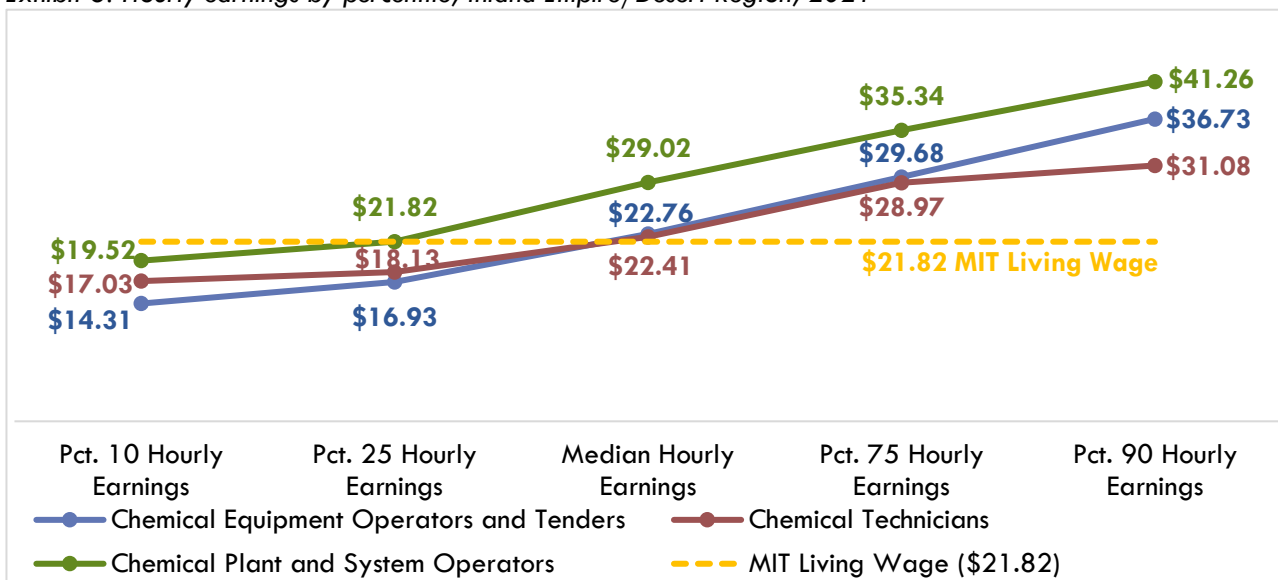
Source: Lightcast 2023.1

Earnings

Community colleges should ensure their training programs lead to employment opportunities that provide a living wage. The MIT living wage calculator estimates that an individual must earn \$21.82 per hour or \$45,386 annually in California to be self-sufficient (Glasmeier, 2023).

Exhibit 3 displays the hourly earnings for the chemical technology occupational group. The median hourly earnings for the chemical technology occupational group are between \$22.41 and \$29.02, above the region's hourly living wage standard (\$21.82 per hour), indicating that at least the top half of workers earn a living wage.

Exhibit 3: Hourly earnings by percentile, Inland Empire/Desert Region, 2021

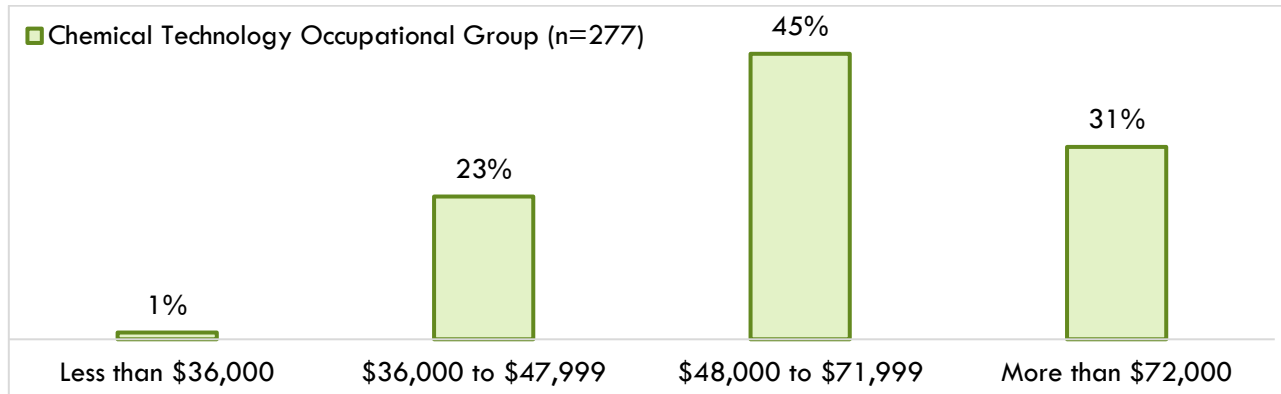


Source: Lightcast 2023.1

Advertised Salary from Online Job Ads

Exhibit 4 displays online job ad salary data for the chemical technology occupational group over the last 12 months. Online job ad salary information reveals employers willing to pay the chemical technology occupational group an average annual salary of \$61,194 or \$29.42 hourly, above the region's \$45,386 annual (\$21.82 hourly) MIT living wage standard. Consider the salary information with caution since only 25% (277 out of 1,123) of online job ads for this occupational group provided salary information.

Exhibit 4: Advertised salary information, California, April 2022 – March 2023



Source: Lightcast 2023.1

Job Titles, Employers, Skills, Education, and Work Experience

Exhibit 5 displays the job titles most frequently requested by employers seeking chemical technology workers in the state over the last 12 months. Displaying job titles may provide insight into the positions available to students after completing a program. The most commonly requested job title for this occupational group in job ads was research associate.

Exhibit 5: Most frequently used job titles in employer job ads, California, April 2022 – March 2023

Job Titles	Job Ads
Research Associates	350
Chemical Technicians	86
Quality Control Chemists	77
Chemical Operators	52
Research and Development Associates	45
Plating Operators	41
Research Technicians	39
Chemistry Technicians	38
Formulation Technicians	23
Process Development Associates	21
All other job titles	772
Total	1,123

Source: Lightcast 2023.1

Exhibit 6 displays the employers that posted the most job ads for the chemical technology occupational group in the region over the last 12 months. Showing employer names provides insight into where students may find employment after completing a program. Gilead Sciences, a research-based biopharmaceutical company, posted the most job ads for the chemical technology occupational group over the previous 12 months.

Exhibit 6: Employers posting the most job ads for the chemical technology occupational group over the last 12 months, California, April 2022 – March 2023

Top Employers	Job Ads
Gilead Sciences	56
University of California	50
Thermo Fisher Scientific	19
Catalent	14
Eurofins	13
Avantor	13
Pacific Biolabs	13
Takeda Pharmaceutical Company	12
Exact Sciences	11
TTM Technologies	10
Pratt & Whitney	10
Labcorp Drug Development	10
<i>All other employers</i>	892
Total	1,123

Source: Lightcast 2023.1

Exhibit 7 lists a sample of specialized and employability skills employers seek when looking for workers to fill chemical technology positions. Specialized skills are occupation-specific skills that employers request for industry or job competency. Employability skills are foundational skills that transcend industries and occupations; this category is often referred to as "soft skills." The skills requested in job ads may be utilized to guide curriculum development.

Exhibit 7: Sample of in-demand skills from employer job ads, California, April 2022 – March 2023

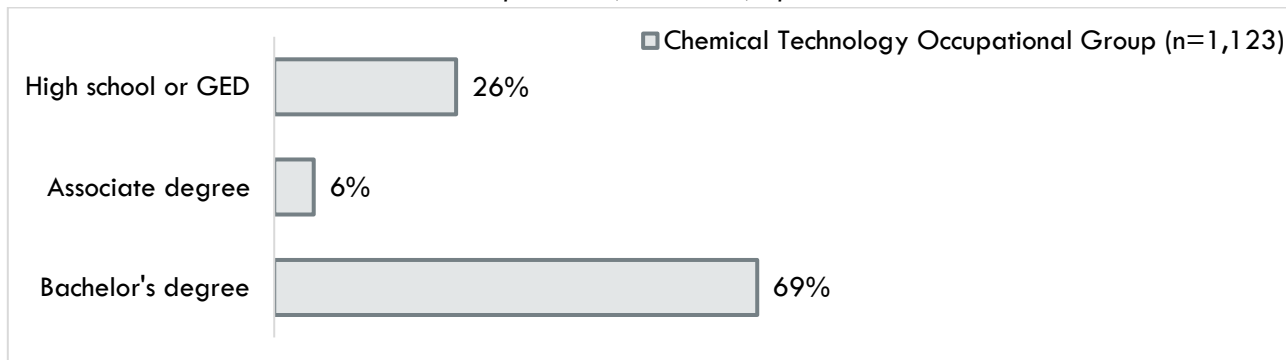
Specialized skills (n=1,123)	Employability skills
<ul style="list-style-type: none"> • High-Performance Liquid Chromatography • Biochemistry • Biology • Analytical Techniques • Good Manufacturing Practices • Analytical Chemistry • Pharmaceuticals • Data Analysis 	<ul style="list-style-type: none"> • Research • Communications • Troubleshooting (Problem-Solving) • Detail Oriented • Writing • Quality Control • Management • Organizational Skills

Source: Lightcast 2023.1

Exhibit 8 displays the minimum advertised education requirements for the chemical technology occupational

group. Most employer job ads (69%) for the chemical technology occupational group sought candidates with a bachelor's degree, while 26% of job ads sought candidates with a high school diploma or equivalent.

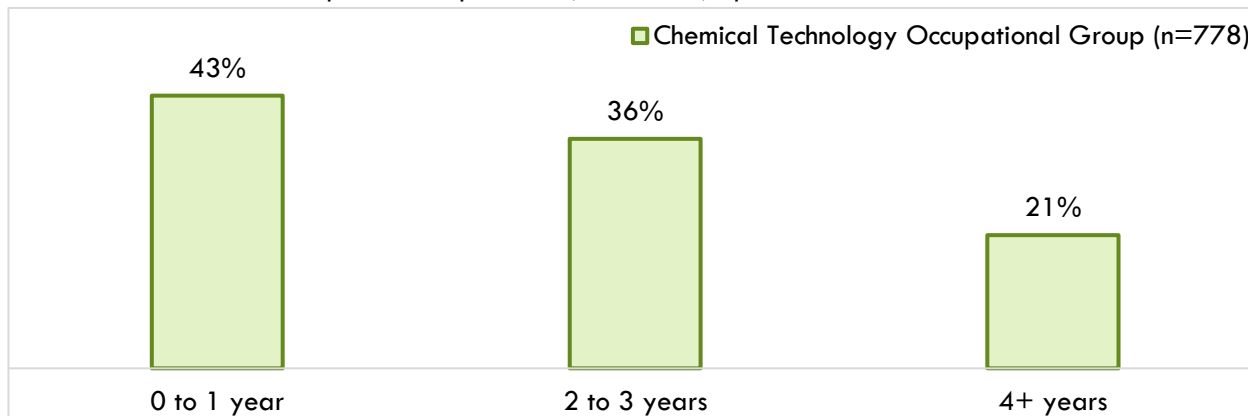
Exhibit 8: Minimum advertised education requirements, California, April 2022 – March 2023



Source: Lightcast 2023.1

Exhibit 9 displays the real-time work experience requirements from employer job ads for the chemical technology occupational group. Approximately 43% of employers sought candidates with zero to one year of previous work experience, while 57% of employers sought candidates with more than one year of work experience, indicating work experience may be valuable to employers.

Exhibit 9: Real-time work experience requirements, California, April 2022 – March 2023



Source: Lightcast 2023.1

Student Completions and Programs Outcomes

The laboratory science technology program (TOP 0955.00) may prepare students for employment in the chemical technology occupational group as it provides a similar education to the chemical technology program. The laboratory science technology program prepares students for employment through instruction of the practical analytical applications for inorganic chemistry, organic chemistry, biochemistry, and other physical and biological sciences in laboratory, testing, and quality control settings in industry and science (Taxonomy of Programs, 2012).

Regional community colleges do not currently offer chemical technology (TOP 0954.00) or laboratory science technology (0955.00) programs. Other postsecondary institutions may utilize the chemical technology/technician CIP code (41.0301) for their chemical technology programs. However, over the last three academic years, no other regional postsecondary education institution issued awards using this program code. The following is the program description for the chemical technology/technician CIP programs.

A program that prepares individuals to apply scientific principles and technical skills in support of chemical and biochemical research and industrial operations. Includes instruction in principles of chemistry and biochemistry, technical mathematics, computer applications, radiochemistry, industrial biochemistry, chemical instrumentation, physical chemistry, laboratory research methods, industrial processing methods and equipment, and test equipment operation and maintenance (IPEDS, 2023).

Summary of Findings

Employment for the chemical technology occupational group is expected to increase by 6% through 2026, with 142 job openings projected annually. The median hourly earnings for the chemical technology occupational group are between \$22.41 and \$29.02, above the region's hourly living wage standard (\$21.82 per hour).

Regional community colleges do not currently offer chemical technology (TOP 0954.00) or laboratory science technology (0955.00) programs. Other postsecondary institutions may utilize the chemical technology/technician CIP code (41.0301) for their chemical technology programs. However, over the last three academic years, no other regional postsecondary education institution issued awards using this program code.

The Centers of Excellence recommends developing occupational training for chemical technology occupations. Colleges considering this program should partner with applicable employers to document their demand for chemical technology workers exiting a community college chemical technology program.

Contact

Michael Goss
Paul Vaccher
Centers of Excellence, Inland Empire/Desert Region
michael.goss@chaffey.edu
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Appendix: Occupation definitions, sample job titles, five-year projections, and earnings for chemical technology occupations

Occupation Definitions (SOC code), Education and Training Requirements, Community College Education Attainment

Chemical Technicians (SOC 19-4031)

Conduct chemical and physical laboratory tests to assist scientists in making qualitative and quantitative analyses of solids, liquids, and gaseous materials for research and development of new products or processes, quality control, maintenance of environmental standards, and other work involving experimental, theoretical, or practical application of chemistry and related sciences.

Sample job titles: Analytical Laboratory Technician (Analytical Lab Technician), Chemical Analyst, Chemical Technician, Laboratory Analyst (Lab Analyst), Laboratory Technician (Lab Tech), Laboratory Tester (Lab Tester), Organic Preparation Analyst (Organic Prep Analyst), Quality Control Laboratory Technician (QC Lab Tech), Quality Control Technician (QC Tech), Research Technician

Entry-Level Educational Requirement: Associate degree

Work Experience Required: None

Training Requirement: Between one and twelve months on-the-job training

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 34%

Chemical Plant and System Operators (51-8091)

Control or operate entire chemical processes or systems of machines.

Sample job titles: Chemical Operator, Loader Technician, Process Control Operator, Process Development Associate, Process Operator, Process Technician, Production Technician

Entry-Level Educational Requirement: High school diploma or equivalent

Work Experience Required: None

Training Requirement: Between one and twelve months of on-the-job training

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 45%

Chemical Equipment Operators and Tenders (51-9011)

Operate or tend equipment to control chemical changes or reactions in the processing of industrial or consumer products. Equipment used includes devulcanizers, steam-jacketed kettles, and reactor vessels.

Sample job titles: Chemical Operator, Chlorination Operator, Multiskill Operator, Outside Operator, Process Operator, Spray Dry Operator, Vessel Operator

Entry-Level Educational Requirement: High school diploma or equivalent

Work Experience Required: None

Training Requirement: Between one and twelve months of on-the-job training

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 35%

Appendix: Methodology

Job ad data is limited to the information provided by employers and the ability of artificial intelligence search engines to identify this information. Additionally, preliminary calculations by Georgetown Center on Education and the Workforce found that "just 30 to 40 percent of openings for candidates with some college or an associate degree, and only 40 to 60 percent of openings for high school diploma holders appear online" (Carnevale et al., 2014). Online job ads often do not reveal employers' hiring intentions; it is unknown if employers plan to hire one or multiple workers from a single online job ad or collecting resumes for future hiring needs. A closed job ad may not be the result of a hired worker.

Table 1. 2021 to 2026 job growth, wages, entry-level education, training, and work experience required for the chemical technology occupational group in the Inland Empire/Desert Region (Riverside and San Bernardino counties combined)

Occupation (SOC)	2021 Jobs	5-Year Change	5-Year % Change	Annual Openings (New + Replacement Jobs)	Entry-Experienced Hourly Wage (10 th to 90 th percentile)	Median Hourly Wage (50 th percentile)	Average Annual Earnings	Entry-Level Education & On-The-Job-Training	Work Experience Required
Chemical Equipment Operators and Tenders (51-9011)	508	36	7%	62	\$14.31 to \$36.73	\$22.76	\$49,800	High school diploma or equivalent & 1 to 12 months	None
Chemical Technicians (19-4031)	419	31	7%	59	\$17.03 to \$31.08	\$22.41	\$49,000	Associate degree & 1 to 12 months	None
Chemical Plant and System Operators (51-8091)	176	5	3%	21	\$19.52 to \$41.26	\$29.02	\$61,600	High school diploma or equivalent & 1 to 12 months	None
Total	1,103	72	6%	142	-	-	-	-	-

Source: Lightcast 2023.1