



# Life Sciences & Biotechnology

19-20 Report, Region 10

**Keau Wong, MBT**

**COMMUNITY COLLEGES**

SAN DIEGO & IMPERIAL COUNTIES

**CAREER EDUCATION**

# OVERVIEW

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LIFE SCIENCES &  
BIOTECHNOLOGY SECTOR



TRENDS



METHODOLOGY



RECOMMENDATIONS



# Sector Overview

# Life Sciences is Encompassing

**Environmental  
Science**

**Pharmaceuticals**

**Biomedical  
Device**

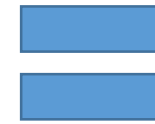
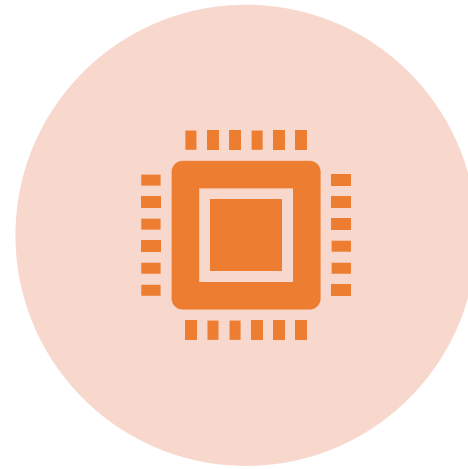
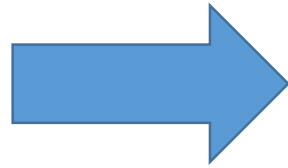
**Nutraceuticals**

**Cosmeceuticals**

**Food &  
Agricultural**

**Biotechnology**

# Fueling...Feeding...& Healing the World



**BIOLOGICAL PROCESS**

**TECHNOLOGIES  
&  
PRODUCTS**

**GLOBAL IMPROVEMENT**

# The Industry includes a Multi-Sector Workforce

**Engineering  
&  
Facilities**

**Compliance  
&  
Legal**

**Global Supply  
Chain  
&  
Logistics**

**Business  
&  
Entrepreneurship**

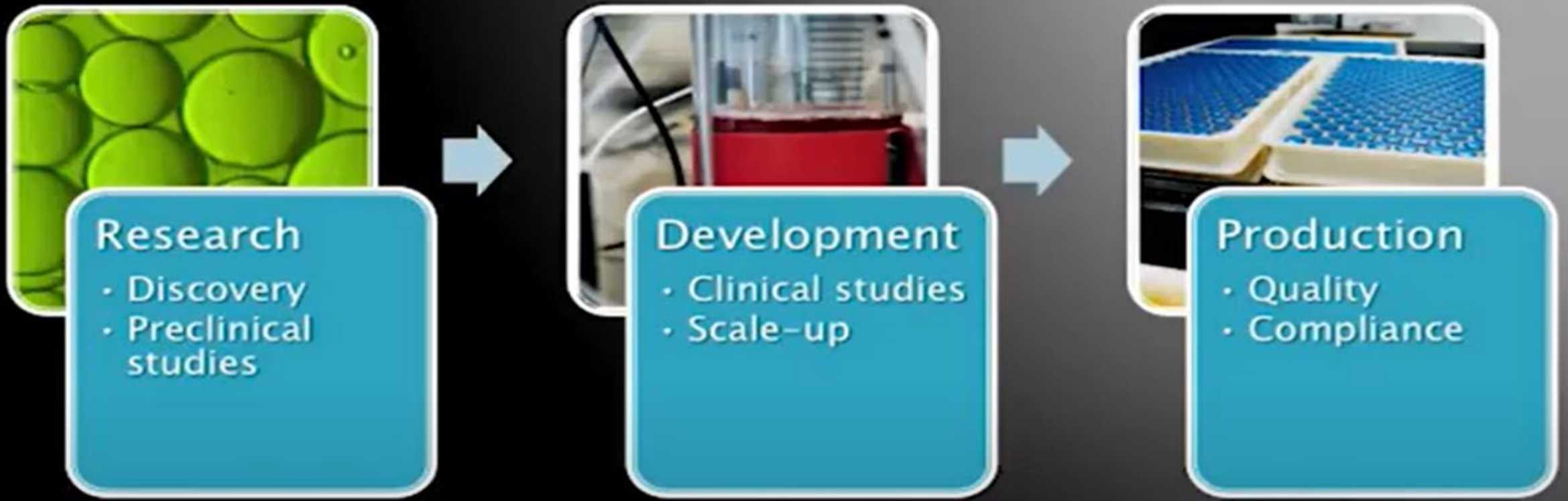
**Quality  
&  
Regulatory**

**Research  
&  
Development**

**Manufacturing  
&  
Production**

# Focused Workforce Training

## Product Development







# LMI: Data and Trends



# Imperial Regional Economic Impact

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654 Sector Employees



Average Earnings ~62k/year



51 Sector Businesses



Global Leader Biofuels

# Imperial Valley

## Agriculture

500k Acres Active Crop Production

## Renewable Energy

2019= \$7.3 Billion

## Environmental Restoration



# San Diego Regional Economic Impact

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1500 Businesses/60k Employees



Average Earnings ~152k/year



13% CA Sector Business  
16% CA Sector Employment



Job Multiplier = 4.57

**\$1.8 billion Q2 2020  
YTD**

**Highlight:** 2020 on pace for record year for VC; Q2 set record high at \$1.2B

**72 deals Q2 2020**

**Highlight:** On pace for same amount round set in 2019 at 144 deals

**\$1.9 billion since  
2015**

**Highlight:** Annual average funding volume



VENTURE CAPITAL  
INVESTMENT

REAL ESTATE  
TRANSACTIONS

WORKFORCE  
DEVELOPMENT

ECONOMIC  
HEALTH



# CALIFORNIA LIFE SCIENCES SECTOR REPORT **2020**



**Total Life Sciences  
Companies in California**

**UP 348** from 2018

**1,805** Biotechnology & Pharmaceutical

**1,961** Medical Equipment & Device Manufacturing

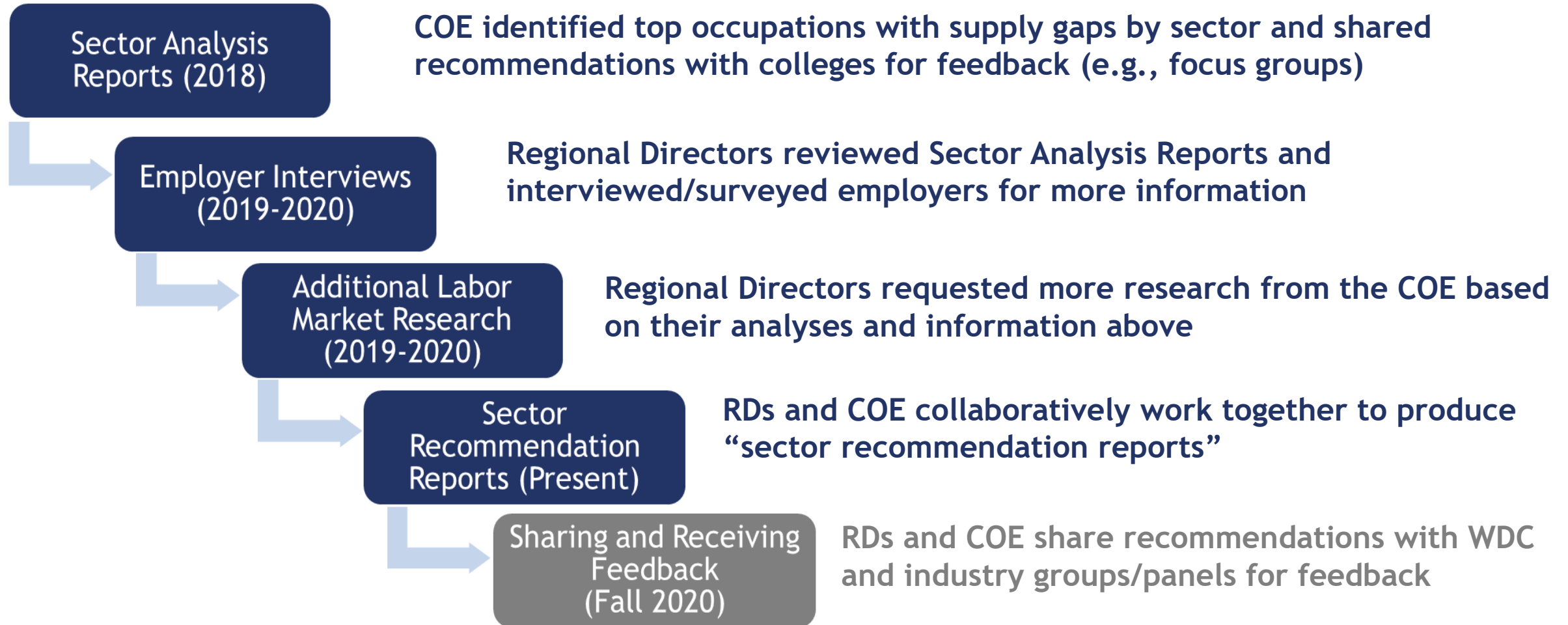
**3,766**  
Total



# COE Sector Analysis Report



# Methodology



# LIFE SCIENCES & BIOTECHNOLOGY

MIDDLE-SKILL JOBS IN THE SAN DIEGO-IMPERIAL REGION





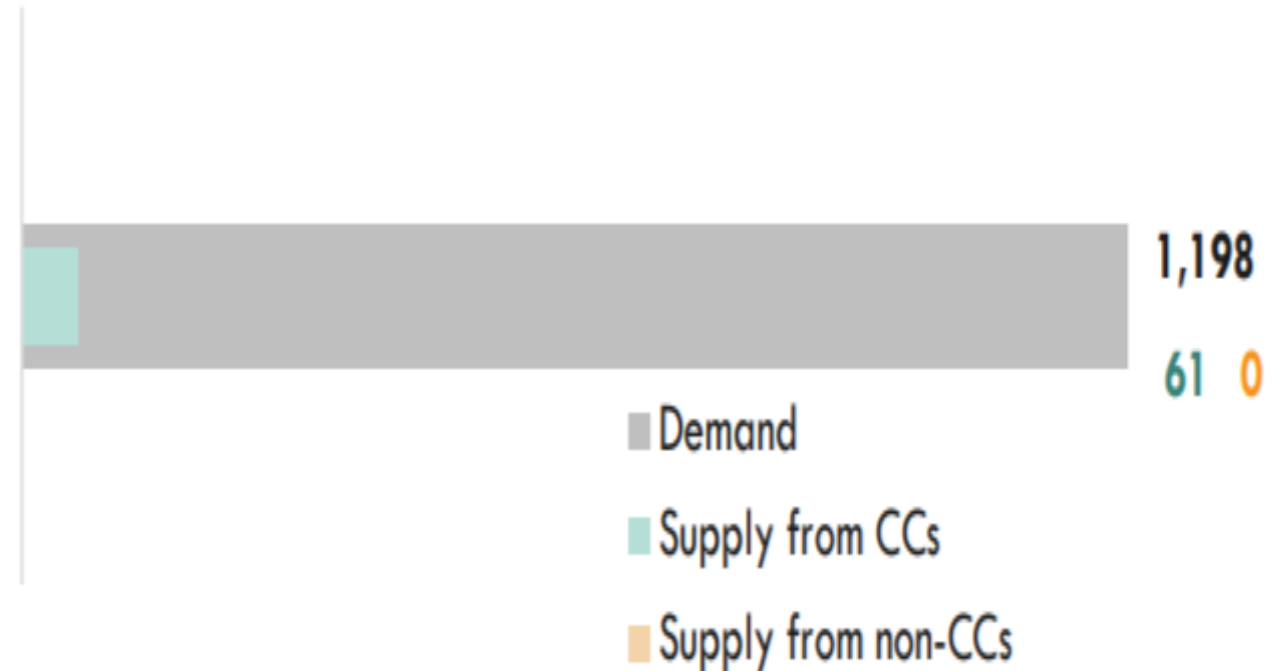
# Nationally Validated KSAs

(Knowledge, Skills, and Abilities)

# Targeted Jobs & Associated KSAs

Demand vs. Supply for Biotechnology and Biomedical Technology (TOP 043000)  
San Diego County

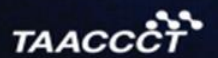
Inspectors, Testers, Sorters, Samplers & Weighers;  
Biological Technicians;  
Manufacturing Production Technicians;  
Quality Control Analysts





# Nationally Validated KSAs

## Core Skill Standards for Bioscience Technicians



**COMMUNITY COLLEGES**  
SAN DIEGO & IMPERIAL COUNTIES  
**CAREER EDUCATION**

REF	Key Functions & Tasks (Upstream Manufacturing Technician)
<b>5</b>	<b>Prepare process materials.</b>
5.a	Weigh, dispense, and label raw materials for use in production.
5.b	Dispense consumables and intermediates.
5.c	Control and reconcile inventory with enterprise control system (MRP, SAP, manual database).
5.d	Prepare and sterilize buffers and solutions.
5.e	Sample and test buffers and solutions.
5.f	Transfer buffers and solutions to use point.
5.g	Prepare filters for use.
5.h	Prepare, pasteurize / sterilize, and titrate media and feed solutions.
5.i	Manage chromatography resins.
<b>6</b>	<b>Prepare equipment.</b>
6.a	Clean CIP vessels, transfer lines, and filter trains .
6.b	Clean COP equipment (or sonicator).
6.c	Depyrogenate components and equipment.
6.d	Sterilize SIP vessels, transfer lines, and sampling ports.
6.e	Perform pressure test.
6.f	Prepare and assemble components and equipment.
6.g	Autoclave components and equipment.
6.h	Perform WFI flush of transferlines.
6.i	Perform scheduled sanitizations of hoods.
6.j	Prepare and standardize probes and ancillary instruments.
6.k	Prepare, assembly, and integrity test filters.
6.l	Visually inspect equipment.
6.m	Maintain equipment logs and status tags.
6.n	Complete, review and approve equipment process records.
<b>7</b>	<b>Perform basic manufacturing operations.</b>
7.a	Perform processes following batch records, validation protocols, and/or SOPs.
7.b	Maintains and controls processes in an automated control environment.
7.c	Record process data.
7.d	Inspect materials at all stages of process to determine quality or condition.
7.e	Participate in the installation, modification, and upgrade of equipment.
7.f	Operate, monitor, and maintain equipment, tools, and workstation.
7.g	Recognize and respond appropriately to atypical events.
7.h	Participate in troubleshooting and root cause analysis of operations.
<b>8</b>	<b>Perform upstream manufacturing operations.</b>
8.a	Work in an aseptic environment (laminar flow hood / biosafety cabinet / cleanrooms).
8.b	Perform vial thaw from a working cell bank.
8.c	Perform cell culture expansion.
8.d	Monitor cell concentration by cell counting or measuring OD.

Source: Community College Consortium for Bioscience Credentials. Harmonization of Biopharmaceutical Manufacturing Skill Standards Key Functions / Tasks

# Nationally Validated KSAs

## Core Skill Standards for Bioscience Technicians



**Biotechnologists**



**Bio-MFG  
Specialists**



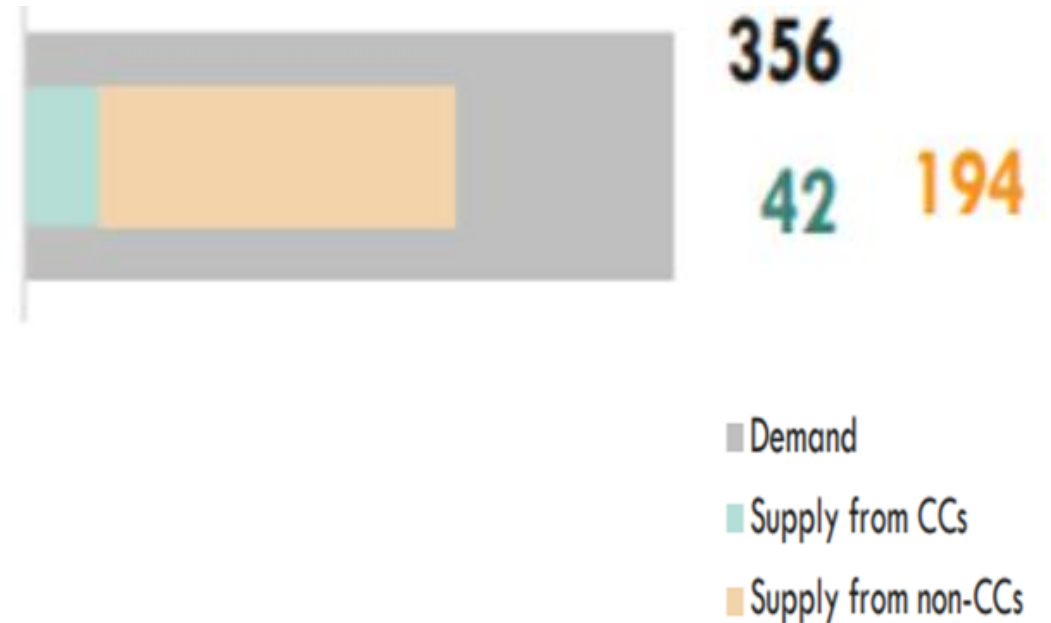
**Quality  
Specialists**



# Clinical Jobs & KSAs

## Life Sciences & Biotech Top Middle-Skill Jobs: Demand vs. Supply San Diego County

Medical and Clinical Laboratory Technicians  
& Technologists



## Clinically Validated KSAs



**Phlebotomist**

**Medical  
Laboratory  
Technician**

**Clinical  
Laboratory  
Scientist**

# Employers & Advisory



# Employers & Advisory







**“Developing programs south of the Interstate-8 (I-8) is challenging to attract students...”**

# **Sector Analysis: I-8 Equity**

- 30+ Medical Reference Laboratories**
- Food Sciences (50+ Breweries)**
- Imperial Valley Agriculture & Environmental**
- Bi-National Industry Partners**
- Manchester Pacific Gateway Expansion**





**“Supply Gap...Low Enrollment...Bachelor’s Preferred.”**

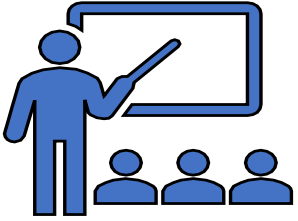
# Sector Analysis: Supply Gap

**Enrollment numbers are low for existing programs:** While there is high labor market demand, few students enroll in existing Life Sciences and Biotechnology programs. Furthermore, there are not a significant number of K-12 programs that prepare students for postsecondary Life Sciences and Biotechnology programs.

**The sector has large labor market demand, but small program supply:** Programs such as Biotechnology and Biomedical Technology (TOP 043000) have large supply gaps and small completion numbers.

**Employers are filling the middle-skill jobs gap with candidates who have bachelor's degrees or higher:** This leads to high turnover once an overqualified individual gets his/her "foot through the door" and moves on to higher positions.

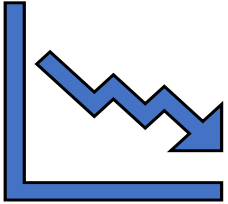
# Sector Analysis: Supply Gap



**Low enrollment and K12 involvement**



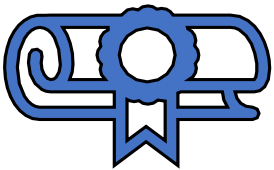
- **Program Logistics**
- **Dual Enrollment-Articulation**
- **Program Marketing**



**Big supply gap and Low completions**



- **Learn and earn opportunities**
- **Program Logistics**
- **Program Marketing**



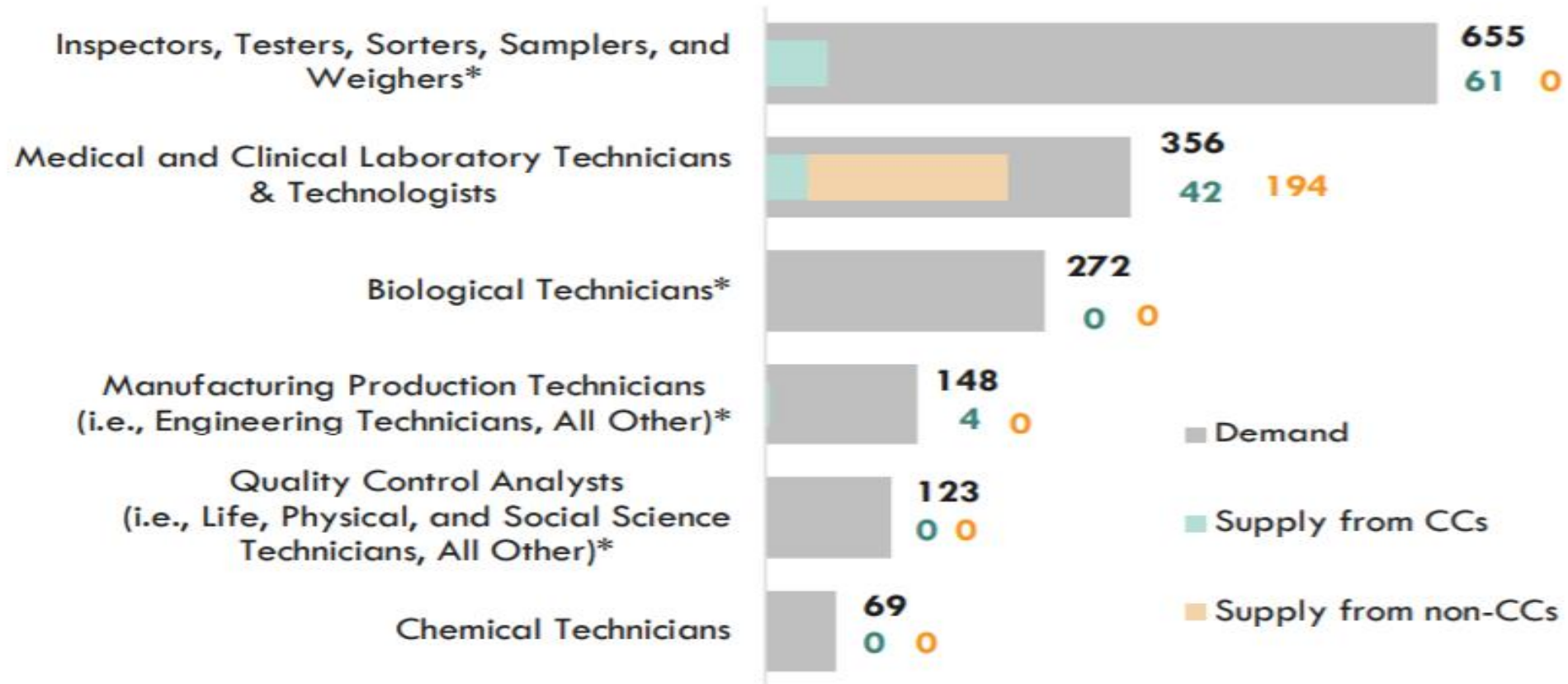
**Bachelor's Degree Preferred**



- **Program Logistics**
- **BDP Bio-MFG Articulation**
- **2+2 Strategies**
- **Alumni Network**

# Supply Gap 1623 Openings (-1322)

Life Sciences & Biotech Top Middle-Skill Jobs: Demand vs. Supply  
San Diego County



# Supply Gap

## Livable Wage Comparison (Attainable Jobs)

Inspectors, Testers, Sorters, Samplers, and Weighers\*

Medical and Clinical Laboratory Technicians & Technologists

Biological Technicians\*

Manufacturing Production Technicians (i.e., Engineering Technicians, All Other)\*

Quality Control Analysts (i.e., Life, Physical, and Social Science Technicians, All Other)\*

Chemical Technicians

**\$19-25/hour**  
**VS.**  
**\$15.99/hour\***

\*Living wage for a single adult in San Diego County = \$15.99



# Supply Gap Livable Wage Comparison (Pathway Jobs)

Occupational Title
First-Line Supervisors of Production and Operating Workers
Compliance Officers (includes Regulatory Affairs Specialists)
Sales Representatives, Wholesale & Manufacturing, Technical & Scientific Products
Medical Scientists, Except Epidemiologists
Manufacturing Engineers*, Biochemical Engineers*, and Validation Engineers* (part of Engineers, All Other)
Chemists
Biological Scientists, All Other
Biochemists and Biophysicists
Laboratory Managers* and Clinical Research Coordinators* (part of Natural Sciences Managers)
Biostatisticians* and Clinical Data Managers* (part of Statisticians)
Biomedical Engineers
Microbiologists

**\$33-45/hour**  
**VS.**  
**\$15.99/hour\***

Living wage for a single adult in San Diego County = \$15.99



# Resiliency Report Confirmation

## RESILIENT JOBS

Top Jobs During the Great Recession and COVID-19 Pandemic

August 2020  
San Diego County

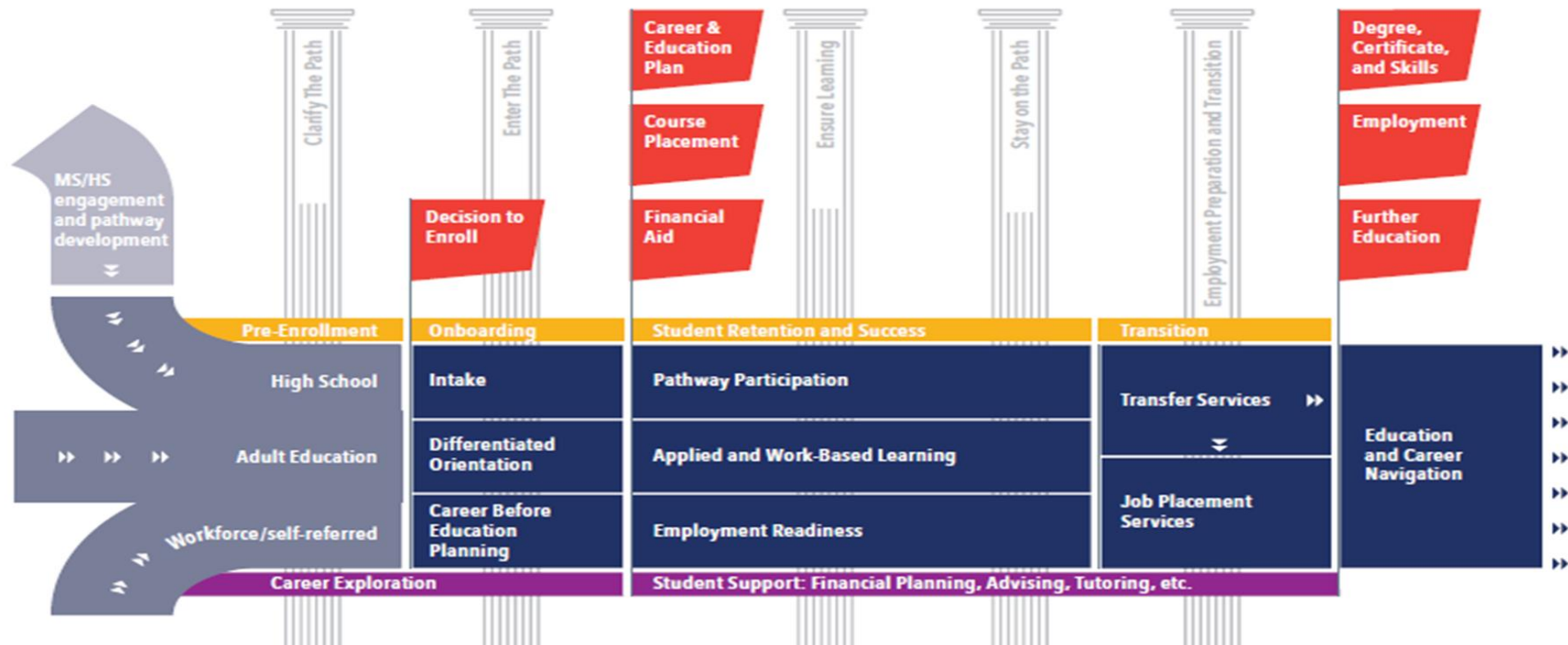


**Sector job areas are resilient.**

**Quality focused careers are both Recession and Pandemic proof.**

# Complete Student Support

## A Community College Student's Road to Success



# Career Pathways (Biotechnologist/Bio-Mfg)

**Assistant Tech**  
\$15-20/hr

**Associate Tech**  
\$17-23/hr

**Mid-Level Tech**  
\$21-28/hr

**Senior-Mgmt**  
\$35/hr & Up

Dual Enrollment  
Articulated K12 Courses  
Fundamental Skills  
3<sup>rd</sup> Party Certifications  
Work Based Learning

Specific Training Tracks  
Work Based Learning  
3<sup>rd</sup> Party Certifications  
DoD Skill Bridge

AA To BS transition  
Transfer Partnerships  
Work Based Learning  
3<sup>rd</sup> Party Certifications

Specific Training Tracks  
Work Based Learning  
3<sup>rd</sup> Party Certifications  
Graduate degree considerations

Work based learning  
Graduate transitioning  
**Alumni Network**  
**Hiring feedback loop**

**K12-Year 1**

**Year 1-Year 2**

**Year 2-Year 3**

**Year 3-Year 4**

**Year 4 & Beyond**

# Career Pathways (Quality Specialist)

**QC Accessioning**  
\$13-18/hr

**QC Associate**  
\$17-23/hr

**QC Analyst**  
\$21-28/hr

**Senior QC-Mgmt**  
\$35/hr & Up

Dual Enrollment  
Articulated K12 Courses  
Fundamental Skills  
3<sup>rd</sup> Party Certifications  
Work Based Learning

Specific Training Tracks  
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**Alumni Network**  
**Hiring feedback loop**

**K12-Year 1**

**Year 1-Year 2**

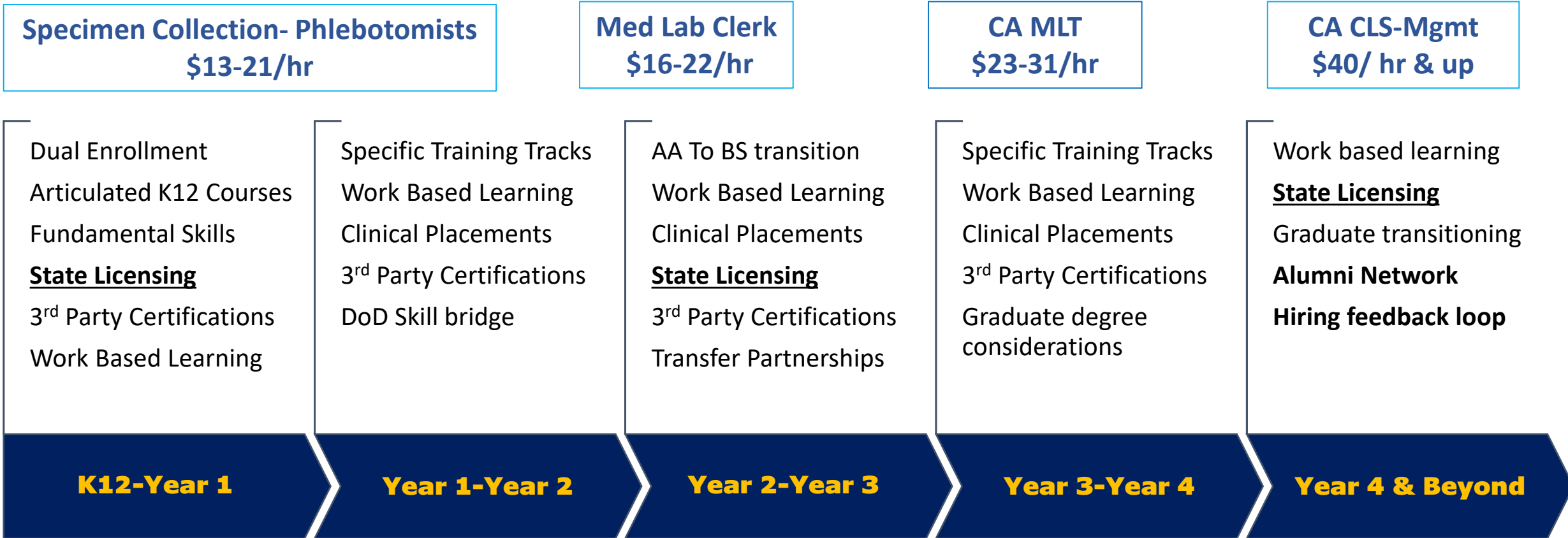
**Year 2-Year 3**

**Year 3-Year 4**

**Year 4 & Beyond**



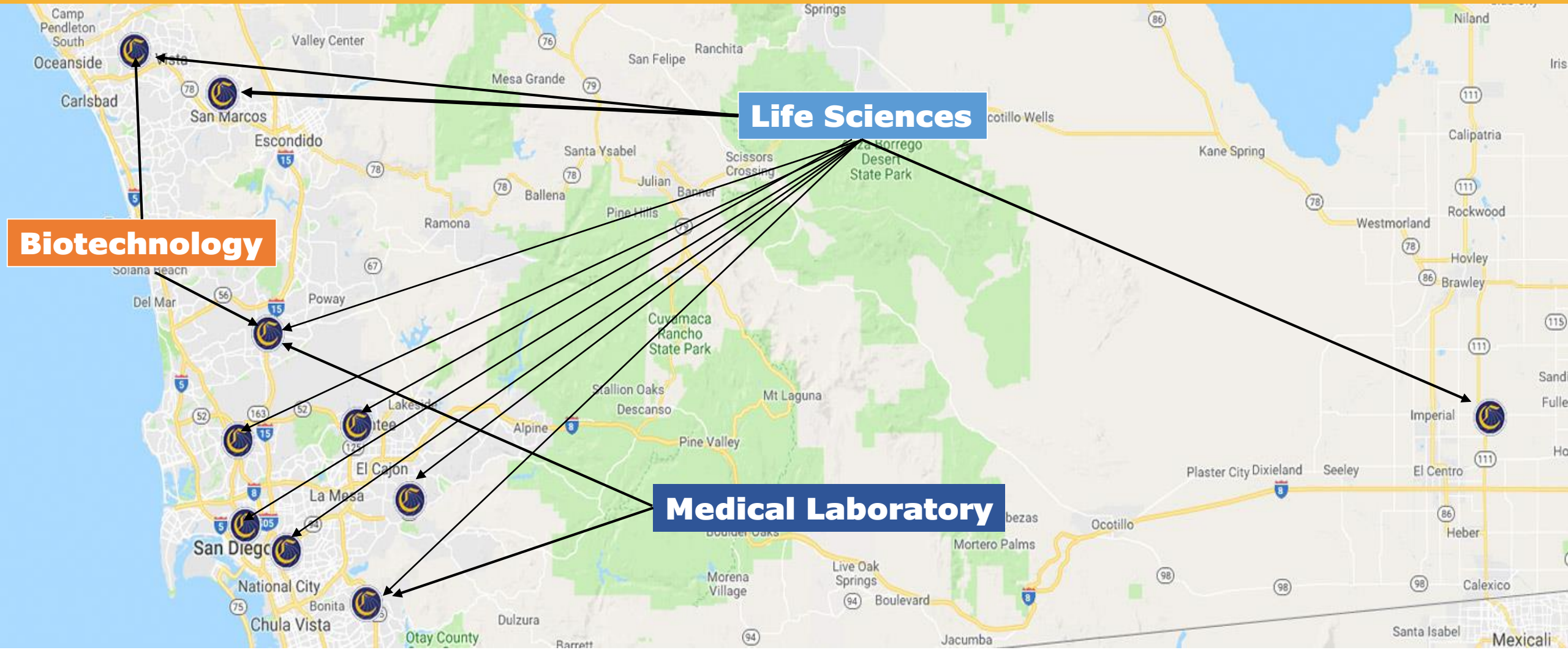
# Career Pathways (Clinical Lab Specialist)



# Sector Recommendations

- 1. K-12 Dual Enrollment Initiatives & WBL**
- 2. Regional Bio-Mfg BDP Curriculum Modifications**
- 3. 2+2 Transfer Strategies**
- 4. Targeted Program Marketing**
- 5. Collaborative Advisory Meetings**

# Regional Life Sciences & Biotechnology



# Mira Costa College

## Challenges

- **Need to increase enrollments and capacity**
- **Need to develop accessible coursework for AM and PM students**
- **Inadequate local and regional marketing**

## Recommendations

- **Increase capacity in the BS program**
  - **Develop AM/PM shift to accommodate working students**
  - **Resolve scheduling issues- logistics, time of day, supporting incumbent workers**
- **Increase local and regional marketing**



# San Diego Miramar College

## Challenges

- **Need to increase enrollments and capacity**
- **Need to develop accessible coursework for AM and PM students**
- **Not currently aligned to Bio-manufacturing programs**
- **Support needed for continuous improvement in the MLTT program**
- **Lack of adequate local and regional marketing**

## Recommendations

- **Identify and resolve scheduling issues, increasing incumbent worker equity**
- **Align or modify courses to Biomanufacturing BDP:  
-(Basic Lab Skills, Biostatistics, Bioprocessing)**
- **Support MLTT pipeline performance modifications**
- **Increase local and regional marketing**

# Southwestern College

## Challenges

- **Support needed for continuous improvement in the MLTT program**
- **Need to develop accessible coursework for AM and PM students**
- **Lack of adequate local and regional marketing**

## Recommendations

- **Develop strategic cohorts (Chemistry and MLTT), hybrid curriculums/compressed coursework**
- **Align or modify courses to Biomanufacturing BDP:  
-(Basic Lab Skills, Biostatistics, Bioprocessing)**
- **Support MLTT pipeline performance modifications**
- **Increase local and regional marketing**

# Imperial Valley College

## Challenges

- **Need additional 4-year STEM options**
- **Need for Imperial County environmental restoration initiatives**
- **Lack of adequate local and regional marketing**

## Recommendations

- **Explore 2+2 MOU with SDSU/IV Chemistry, Department expansion**
- **Develop clear agreements into other sectors, specific 4-year programs**
- **Identify crossover initiatives (biotechnology and entrepreneurship)**
- **Increase local and regional marketing**

# Regional Colleges

## Challenges

- **Low enrollment from STEM students**
- **Lack of general biotechnology training in STEM departments.**
- **Not currently aligned to Bio-Manufacturing programs**
- **Inadequate local and regional marketing**

## Recommendations

- **Add/modify Commercial Fermentation Science course for transfer**
- **Develop STEM focused cohorts combined with WBL**
- **Align or modify courses to Bio-manufacturing BDP**

**(Basic lab Skills, biostatistics, bioprocessing)**



# K-12

## Challenges

- **Sector students prefer traditional 4-year pathway**
- **Need more adequate industry recognized certifications (IRC)**
- **Inadequate local and regional marketing**

## Recommendations

- **Create/update dual enrollment, articulation agreements**
- **Explore STEM-Focused Cohorts combined with WBL**
- **Align to 3rd party certifications (Phlebotomy, Lean Six Sigma, 21st Century)**
- **Increase local and regional marketing**

# THANK YOU

**Keau Wong, MBT**  
**Life Sciences Biotechnology Sector**  
**San Diego/Imperial Counties**  
**California Community Colleges**  
**San Diego/Imperial Counties Regional Consortium**  
**Email: [kwong@miracosta.edu](mailto:kwong@miracosta.edu)**  
**Work: (760) 750-2121**

**COMMUNITY COLLEGES**

SAN DIEGO & IMPERIAL COUNTIES

**CAREER EDUCATION**

