

CTE Program Proposal

NAME OF COLLEGE: Modesto Junior College

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DATE: 12/11/15

Division: Agriculture and Environmental Sciences (Dean: Don Borges)

Faculty: Steve Amador, Instructor of Agriculture

PROGRAM NAME: Irrigation Construction & Installation

☒ New Program Proposal

☐ Program Revision Proposal

TYPE OF DEGREE:

- ☒ Certificate
- ☐ Associate of Arts
- ☐ Associate of Science
- ☐ Associate of Arts for Transfer
- ☐ Associate of Science for Transfer
- ☐ Other

ATTACHMENTS REQUIRED:

Labor/Job Market Data and Analysis
Advisory Committee Meeting Minutes
Employer Survey

A. Appropriateness to Mission

1. Statement of Program Goals and Objectives

The goal of the proposed Irrigation Construction and Installation Certificate is to increase the number, preparation and technical expertise of irrigation technicians and designers who are prepared to improve agriculture water management, increase irrigation delivery system efficiency, and enhance on-farm water conservation. The goals match those listed in the Education Code 66010.4, specifically section 1a, 2a and 3.

The distribution and maintenance of clean water impacts every industry in the Valley. Agriculture is the largest consumer of fresh water, accounting for 79.9% of water use compared to 4.3% for domestic use. The Water sector provides economic vitality to the Valley and is a critical component of public health and overall daily life. (source: Center of Excellence, Water Sector Profile 2013). The water sector is heavily reliant on technology to increase efficiency and effectiveness. Over the last several years, evolving technology has changed the way industries that use water must operate, thereby impacting skill requirements of technicians. New technology has created a skills gap as it develops more quickly than the industry can keep up with. Irrigation efficiency and water conservation are critical, creating a need for irrigation technicians with state-of-the-art skills. Technology that enables remote monitoring, precise irrigation designs and projections, and increased water conservation will be embedded in the development of certificates and degrees found in the Irrigation Technology Program at Modesto Junior College.

2. Catalog Description

This certificate prepares students for jobs in the irrigation construction and installation industry. Training and skill development include; piping identification and installation, equipment operation, cost estimating, and plan interpretation. Contact the division office in the Agriculture Building for advising assistance.

Program Learning Outcomes: Upon completion of the degree, students will be able to do the following:

1. Perform complete irrigation system installation from the pumping system to water discharge.
2. Develop accurate cost estimates for both irrigation components and labor costs.
3. Operate installation equipment such as tractors, backhoes, trenchers, graders and laser levels in a safe efficient manner.

3. Program Requirements

Display of Program Requirements

Core Courses	Title	Semester Sequence	Units
AGM 210	Agricultural Welding	1	3
AGM 214	Equipment service and Safety	1	1
AGM 235	Irrigation and Drainage	1	3
AGM 237	Irrigation Wells, Pumps and Drive Systems	1	3
AGM 239	Irrigation System Installation and Maintenance	2	3
	Total Units		13

4. Background and Rationale

The Modesto Junior College Agriculture Department has received several grants to assist in the development of the Irrigation Technician program. With state drought relief funding along with a grant from the National Science Foundation, we have been able to begin development of lab facilities and equipment. Current grant funding is just under \$900,000. In addition to laboratory facilities and equipment, we have begun delivering the first irrigation course and are presently teaching our first cohort in Irrigation Technology. Presently there are 22 students enrolled in the first cohort and we look for enrollment and course offerings to increase in the upcoming semesters. The goal is to graduate our first group of students in the spring of 2017 and continue to supply the industry with needed technicians for years to come.

The Irrigation Construction and Installation Certificate is to prepare students for jobs in the irrigation construction and installation industry. Training and skill development that includes; piping identification and installation, equipment operation, cost estimating, and plan interpretation. The certificate is one of several short stackable and interwoven certificate options for students in their study of Irrigation technology.

B. Need for Program

5. Enrollment and Completer Projections

CB 01: COURSE DEPT/NO	CB 02: COURSE TITLE	2016-17		2017-18	
		SECTIONS OFFERED (ANNUAL)	ENROLLMENT TOTAL (ANNUAL)	SECTIONS OFFERED (ANNUAL)	ENROLLMENT TOTAL (ANNUAL)
AGM 210	Agricultural Welding	*	*	*	*
AGM 214	Equipment Service and Safety	*	*	*	*
AGM 235	Irrigation and Drainage	2	45	3	75
AGM 237	Irrigation Wells, Pumps and Drive Systems	1	22	1	25
AGM 239	Irrigation System Installation and Maintenance	1	22	1	25

** Denotes course part of agriculture foundational courses that are required for students in multiple agriculture certificates and/or degree programs. Irrigation Technology students will enroll in these courses along with students from other programs.*

6. Place of Program in Curriculum/Similar Programs

The proposed certificate is part of the Irrigation Technology program at MJC is independent and unique to the campus; there are no other similar programs or programs with similar curriculum.

AS Degree Irrigation Technology		
Certificate: Irrigation Technology		
Certificate: Irrigation Management	Certificate: Irrigation Design	Certificate: Construction & Installation

7. Similar Programs at Other Colleges in Service Area

The MJC Irrigation Construction and Installation Certificate uniquely offered in the Central Valley and Mother Lode Region and California. West Hills Coalinga is developing some similar courses through their efforts with an Irrigation Manager or Installation Technician Certificate; however, this program is too far for students residing in Stanislaus County to commute for classes. Further, few community colleges are offering courses that lead to a college certificate and/or 3rd party industry certification achievement.

8. Labor Market Information and Analysis

Please See Attachment

9. Employer Survey

Discuss in this area, or as a separate attachment, employer input in regard to necessity of program and number of jobs available.

Faculty does not believe a survey is needed. Much work has been done via the local advisory committee and research work through the National Science Foundation Grant associated with skill trends for Agriculture Irrigation Specialist associated occupation duties and skills.

10. Explanation of Employer Relationship

Whenever a program is to be offered in close cooperation with one or more specific employers, a discussion of the relationship must be provided.

The Irrigation Construction and Installation Certificate of Achievement follows Title 5, section 51006 requirements. It is designed for student interested in obtaining skills and preparation for employment in the industry. Local employers serve on the advisory committee, offer internship and employment placement sites and support the program via donation of (a) time in class as guests, (b) support of site field trips, (c) supplies, technology and equipment and (d) outreach support.

11. List of Members of Advisory Committee

This list must include advisory committee member names, job titles, and business affiliations.

Steve Amador – Modesto Junior College
 Donald Borges – Modesto Junior College
 Jenni Abbott – Modesto Junior College
 Elizabeth Orozco-Wittke – Modesto Junior College
 Darren Aldaco – Eurodrip USA
 Dominick Amador – RMC Water
 Ray Azevedo – JM Equipment
 Tim Boyd – Retired Irrigation Designer
 Alex Buenrostro – Turlock Irrigation District
 Caitie Campodonico – East San Joaquin Water Coalition
 John Davids – Modesto Irrigation District
 Sam Terpstra – Oakdale Irrigation District
 Jake Wenger – Local Grower
 Jason Word – Turlock Irrigation District

12. Recommendation of Advisory Committee

In a separate attachment, provide minutes of the advisory committee meetings at which the program was discussed and approved, with relevant areas highlighted, as well as a summary of the advisory committee recommendations.

C. Curriculum Standards

13. Display of Proposed Sequence

First Semester		Units
AGM 210	Agricultural Welding	3
AGM 214	Equipment service and Safety	1
AGM 235	Irrigation and Drainage	3
AGM 237	Irrigation Wells, Pumps and Drive Systems	3
Total		10

Second Semester		Units
AGM 239	Irrigation System Installation & Maintenance	3
Total		3

14. Transfer Applicability (if applicable)

Not applicable

D. Adequate Resources and Compliance

15. Library and Learning Resources Plan

Discuss resources currently available for course support, as well as resources recommended for purchase to further support the course.

No additional resources will be require beyond the college's current library and learning resources.

16. Facilities and Equipment Plan

Discuss facilities and equipment currently available for course support, as well as facilities and equipment recommended for purchase to further support the course.

NSF Grant and CTE Enhancement Funds have been appropriated to purchase initial technology and equipment need to start the program. The college will work with other colleges in the region as part of the CTE Enhancement Regional Project to identify future equipment and facility needs.

17. Financial Support Plan

Discuss how the program, including faculty, will be funded.

Financial support for program will be address under the division's annual college operational resources planning projections for agricultural programs.

18. Faculty Qualifications and Availability

Discuss the discipline, qualifications and availability of faculty as it relates to the proposed program.

The faculty discipline for this program is Agriculture. Presently, current FT faculty and adjunct faculty are available to support program. All faculty that teach in this program will meet the State minimum qualifications and possess knowledge and experience in this program area.

19. Based on model curriculum (if applicable)

State the model curriculum on which the proposed program is based.

N/A

20. Licensing or Accreditation Standards

List any licensing, accreditation or certifications available to program completers.

No required licensing or accrediting standards apply to this program. No additional student selection criteria is required, this program complies with California Code of Regulations, title 5 section 55201 and 58106.

21. Student Selection and Fees

If the program is selective, describe relevant entry criteria and the selection process for admission to the program. Specify all mandatory fees that students will incur for the program aside from the ordinary course enrollment fee.

There are no additional fees require beyond those identified in California Education Code section 76300

Irrigation Technology Advisory Committee
Minutes
May 20, 2015

The following advisory committee members were in attendance

Steve Amador – Modesto Junior College
Donald Borges – Modesto Junior College
Jenni Abbott – Modesto Junior College
Elizabeth Orozco-Wittke – Modesto Junior College
Darren Aldaco – Eurodrip USA
Dominick Amador – RMC Water
Ray Azevedo – JM Equipment
Tim Boyd – Retired Irrigation Designer
Alex Buenrostro – Turlock Irrigation District
Caitie Campodonico – East San Joaquin Water Coalition
John Davids – Modesto Irrigation District
Sam Terpstra – Oakdale Irrigation District
Jake Wenger – Local Grower
Jason Word – Turlock Irrigation District

I. Introductions – Members introduced themselves during dinner

II. Grant overview

The group was brought up to date on the Irrigation Technology grants that have been awarded to Modesto Junior College. Grant sources are the National Science Foundation, California Drought Relief and California CTE Enhancement Funds.

III. Review of additional program courses

Steve Amador introduced the new courses that were added to the program and discussion followed as to the content and relevance of the courses. Upon completion of the discussion, the advisory committee voted unanimously to approve development of the courses. The Irrigation Technology program will develop the following courses;

Irrigation and Drainage (currently offered)
Advanced Irrigation and Drainage
Irrigation Systems Design
Irrigation Systems Installation and Maintenance
Agriculture Wells, Pumps and Drive Systems

IIIV. Review of program degrees and certificates.

Steve Amador introduced ideas for a new AS degree and certificates in Irrigation Technology. Discussion followed and the group agreed unanimously, by vote, to develop the following certificates and degrees;

Associates in Science Degree in Irrigation Technology
Certificate of Achievement in Irrigation Technology
Certificate of Achievement in Irrigation Management
Certificate of Achievement in Irrigation Design
Certificate of Achievement in Irrigation Construction and Installation

V. Facilities and Equipment

A tour of the proposed irrigation laboratory site concluded the evening. The group discussed the proposed site and the equipment it would contain.

Monster – Irrigation Specialist (Job Description)

Irrigation Specialist Overview

Irrigation Specialists contribute to design, installation and implementation of sprinkler systems on both residential and commercial properties. Also known as Irrigation Technicians or Grounds Maintenance Workers, the job is often hands-on with piping installations underground. Specialists may also take on a more abstract position when considering landscaping contours for proper drainage and safe piping installation standards. Workers can work on new construction sites or on repairing older sprinkler systems including nozzle replacements and adjustments. Work hours are normally full-time, moving between job sites throughout the day. There is often little office time for these roaming specialists.

Irrigation Specialist Education Requirements

Unless an employer is looking for an inexperienced candidate to teach from scratch, similar to an apprentice, most Irrigation Specialists need a two-year degree or certificate from a landscaping program. Typically offered by trade and community colleges, potential Specialists learn about landscaping science, from soil aspects to sprinkler installations. With irrigation science solidified in their minds, candidates are able to apply their knowledge in real-world scenarios. Once hired, textbook applications are enhanced with work experience, making the specialist even more valuable in the hiring pool.

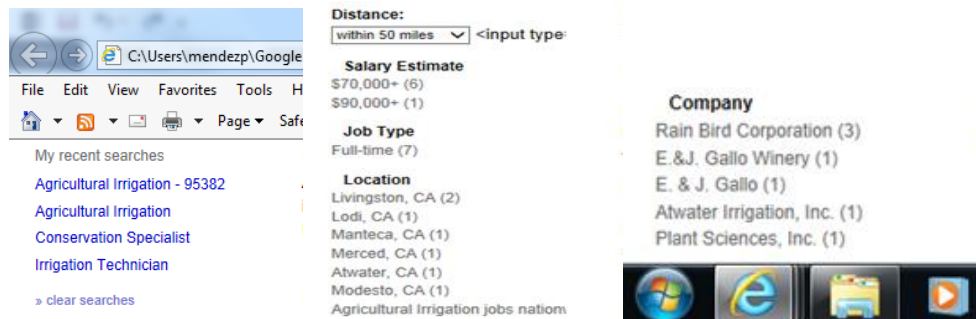
Irrigation Specialist Job Market

According to recent statistics, a 13 percent growth rate is expected in this profession between 2012 and 2022. With environmental concerns as a top priority, more businesses and homeowners see landscaping as a way to naturally cool a building and add oxygen to the air. Irrigation specialists are crucial for dry areas where rainfall can't be depended on for healthy plant growth. Sprinkler systems that conserve water are highly coveted, allowing irrigation specialists to apply their knowledge to an important niche. They can even branch out to other gardening or landscaping positions, such as [Horticulturists](#) and [Greenhouse Workers](#).

Irrigation Specialist Salary

Although general Grounds Maintenance Workers make around \$23,000 a year, Irrigation Specialists, who concentrate on sprinkler and landscape science, can earn between \$55,000 and \$59,000 a year, depending on the company. Schooling and experience make a difference in this industry. With more knowledge comes better pay.

INDEED – Sample Job Search [C:\Users\mendezp\Google Drive\Central Mother Lode Region Consortium\MJC CTE Program Requests for Endorsement\Irrigation Technology\Agricultural Irrigation Jobs, Employment in Modesto, CA 95350 Indeed_com.htm]



District Sales Manager - Agriculture - new

[Rain Bird Corporation](#) - [27 reviews](#) - Modesto, CA +1 location

Agricultural irrigation sales experience in California. **Irrigation** experience including design and installation....

[Easily apply](#)

13 days ago - [save job](#) - [email](#) - [more...](#)

District Sales Manager - Agriculture Production/Irrigation - new

[Rain Bird Corporation](#) - [27 reviews](#) - Lodi, CA

Agricultural irrigation sales experience in California. **Irrigation** experience including design and installation....

[Easily apply](#)

30+ days ago - [save job](#) - [email](#) - [more...](#)

Nursery Production & Harvest Operations Manager - new

Plant Sciences, Inc. - Manteca, CA

Preparation includes ground work, interpretation of soil analysis with pre-plant soil amendment recommendations, soil fumigation, and season long oversight on a...

AgCareers.com - 12 days ago - [save job](#) - [email](#) - [more...](#)

Manager - new

E. & J. Gallo - Livingston, CA 95334

Maintains current knowledge of industry trends and developments to improve **agricultural** systems and processes....

E. & J. Gallo Winery - 30+ days ago - [save job](#) - [email](#) - [more...](#)

Manager (Viticulture and Ag Technical Services) - new

E.&J. Gallo Winery - Livingston, CA 95334

Maintains current knowledge of industry trends and developments to improve **agricultural** systems and processes....

30+ days ago - [save job](#) - [email](#) - [more...](#)

•
Irrigation Designer - new

Atwater **Irrigation**, Inc. - Atwater, CA

\$45,000 - \$65,000 a year

Atwater **Irrigation**, Inc. Is an **agricultural irrigation** supply company located in the Central Valley, CA that is growing and in need of a full-time **irrigation...**

[Easily apply](#)

30+ days ago - [save job](#) - [email](#) - [more...](#)

•
District Sales Manager

Rivulis **Irrigation** - North America - San Joaquin Valley, CA

Substantial technical knowledge of **agricultural irrigation** products, services, designs and applications.

Irrigation, Agriculture or Farming Experience:....

[Easily apply](#)

30+ days ago - [email](#)

Sponsored

We have removed 1 job posting very similar to those already shown. To see the additional result, you may [repeat your search with the omitted job posting included](#).

Irrigation Association

The screenshot shows the Irrigation Association website. The browser address bar displays the URL: C:\Users\mendezp\Google Drive\Central Mother Lode Region Consortium\MIC. The website header includes the Irrigation Association logo and navigation links: HOME, LOGON, MANAGE PROFILE, CALENDAR, REGISTER, STORE, MY CART. A secondary navigation bar includes ABOUT NEWS, MEMBERSHIP, EDUCATION, CERTIFICATION, POLICY, STANDARDS, and RESOURCES. A search bar is located next to the RESOURCES link. The main content area is titled "Agriculture Certifications" and features a "Certified Agricultural Irrigation Specialist" badge. Below this, a paragraph states: "Certification gives you a competitive edge. Become a certified agricultural irrigation specialist and:" followed by a bulleted list of benefits: "Add instant credibility with customers and employers.", "Increase job opportunities.", "Demonstrate your commitment to efficient water management.", and "Qualify to become an [USDA Technical Service Provider](#)." A section titled "CAIS Overview" follows, stating: "Certified agricultural irrigation specialists manage and operate on-farm irrigation systems. They:" followed by a bulleted list: "Understand surface irrigation methods and pressurized systems, including micro-irrigation and sprinklers.", "Evaluate crops and determine water availability and use requirements.", "Understand soil-plant-water relationships and how salinity affects irrigation.", and "Select the most effective irrigation methods and equipment for the application." The left sidebar contains links for CERTIFICATION, Certification Benefits, Certification Candidate Handbook, Landscape Certifications, Agriculture Certifications, CAIS, CID - Agriculture, Register for Exams, Prepare for Exams, Maintain Your Certification, Submit CEUs, and Market Your Certification. The bottom of the page shows a Windows taskbar with various application icons and a system clock indicating 9:21 AM on 12/1/2015.

The screenshot shows the Irrigation Association website, specifically the "CID-Agriculture Overview" page. The browser address bar displays the URL: C:\Users\mendezp\Google Drive\Central Mother Lode Region Consortium\MIC. The website header is identical to the previous screenshot. The main content area is titled "Agriculture Certifications" and features a "Certified Irrigation Designer - Agriculture" badge. Below this, a paragraph states: "Certification gives you a competitive edge. Become a certified agriculture irrigation designer and:" followed by a bulleted list of benefits: "Add instant credibility with customers and employers.", "Increase job opportunities.", "Demonstrate your commitment to efficient water management.", and "Qualify to become an [USDA Technical Service Provider](#) (drip/micro, sprinkler and surface specialties).". A section titled "CID-Agriculture Overview" follows, stating: "CIDs establish specifications and design drawings for agriculture irrigation projects. CIDs:" followed by a bulleted list: "Evaluate site conditions and determine water availability and use requirements.", "Select the most effective irrigation equipment, methods and materials for the application.", "Develop efficient and cost-effective irrigation designs that meet the plant or crop's watering requirements.", and "Prepare comprehensive plans and specifications that include construction details, equipment or materials, as well as appropriate irrigation schedules." The left sidebar is identical to the previous screenshot. The bottom of the page shows a Windows taskbar with various application icons and a system clock indicating 9:22 AM on 12/1/2015.

ABSTRACT

State-of-the-Art Technical Skills for Agriculture Irrigation Technicians

Modesto Junior College (MJC) sits in Stanislaus County in the heart of California's Central Valley, a region that is 26,000 square miles of some of the richest agricultural soil in the world. In spite of the ideal growing environment, California's agricultural operations are struggling as the state experiences one of the worst droughts in its history. The impact is so severe that more than 400,000 acres of normally productive acreage sits fallow this year. Many of the farmers still operating use the old surface irrigation methods of their grandfathers, wasting significant amounts of water with each irrigation. New technology has created a skills gap as it develops more quickly than the industry can keep up with. Irrigation efficiency and water conservation are critical, creating a need for irrigation technicians with state-of-the-art skills. Technology that enables remote monitoring, precise irrigation designs and projections, and increased water conservation will be embedded in this new program.

To address this growing challenge, MJC will implement an Agriculture Irrigation Technology program. The goal of this project is to increase the number, preparation and technical expertise of irrigation technicians and designers who are prepared to improve agriculture water management, increase irrigation delivery system efficiency, and enhance on-farm water conservation. Three specific objectives will support the goal of the program: **1)** Develop and deliver standardized curriculum that advances the efficient design and use of irrigation systems and can be replicated at other institutions; **2)** Create a pipeline of skilled, certified technicians that meet current conservation, efficiency and water management regulations; and **3)** Increase recruitment and success rates for underrepresented students in agricultural science technical programs.

Technical Description: Specific activities to support the goal of increasing the number, preparation and technical expertise of irrigation technicians and designers who are prepared to improve agriculture water management, increase irrigation delivery system efficiency, and enhance on-farm water conservation will be implemented. They include development of a new associate degree, an Irrigation Technology Summer Institute to increase the recruitment and retention of typically underrepresented students in this field, on-site student advising, hands-on experience with state-of-the-art technology, and industry internships.

The design of new curriculum will combine a strong foundation in science, including critical components of plant science, soil science, hydrology, and meteorology with cutting edge technology that enables workers to accurately put water when and where it is needed. The development of this program will contribute to multiple agricultural science areas. It has relevance for animal science, plant and crop science, environmental horticulture, as well as other agriculture disciplines. Skilled technicians with strong scientific backgrounds will be the greatest need of the industry in the next several years according to area irrigation organizations and companies.

Occupation Overview

EMSI Q3 2015 Data Set

December 2015

Modesto Junior College



435 College Avenue
Modesto, California 95350
209.575.6550

Parameters

Occupations

Code	Description
17-2021	Agricultural Engineers
17-2081	Environmental Engineers
45-2091	Agricultural Equipment Operators

Regions

Code	Description
6047	Merced County, CA
6077	San Joaquin County, CA
6099	Stanislaus County, CA

Timeframe

2015 - 2025

Datarun

2015.3 – QCEW Employees, Non-QCEW Employees, Self-Employed, and Extended Proprietors

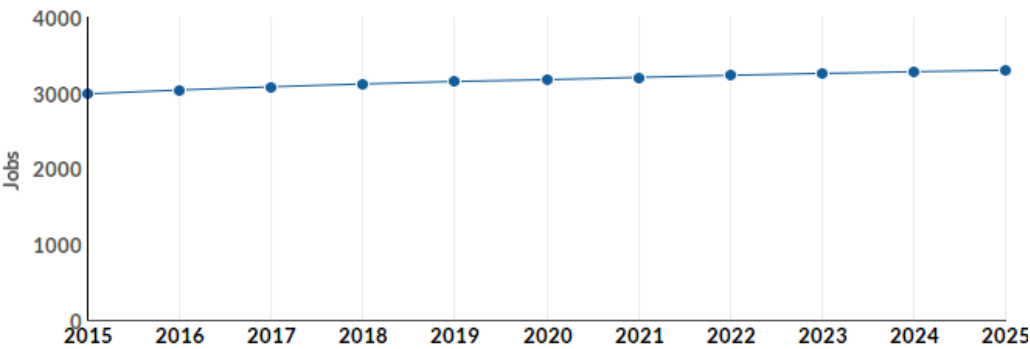
3 Occupations in 3 Counties

Occupation Summary for 3 Occupations

<div>2,993</div> <div>Jobs (2015)</div> <div>590% above National average</div>	<div>+10.4%</div> <div>% Change (2015-2025)</div> <div>Nation: +11.4%</div>	<div>\$12.71/hr</div> <div>Median Hourly Earnings</div> <div>Nation: \$24.79/hr</div>
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Growth

<div>2,993</div> <div>2015 Jobs</div>	<div>3,305</div> <div>2025 Jobs</div>	<div>313</div> <div>Change (2015-2025)</div>	<div>10.4%</div> <div>% Change (2015-2025)</div>
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Occupation	2015 Jobs	2025 Jobs	Change	% Change
Agricultural Engineers (17-2021)	7	7	0	0%
Environmental Engineers (17-2081)	82	95	13	16%
Agricultural Equipment Operators (45-2091)	2,903	3,203	300	10%

Percentile Earnings

\$10.97/hr

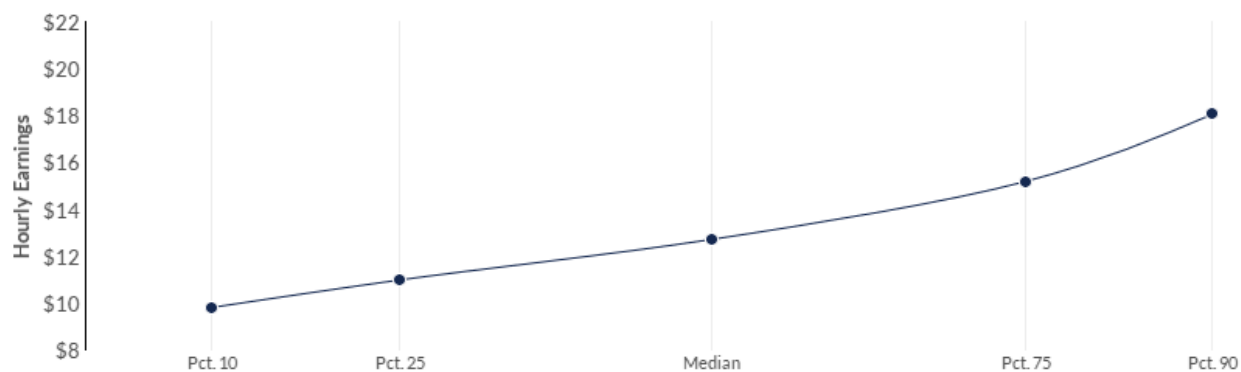
25th Percentile Earnings

\$12.71/hr

Median Earnings

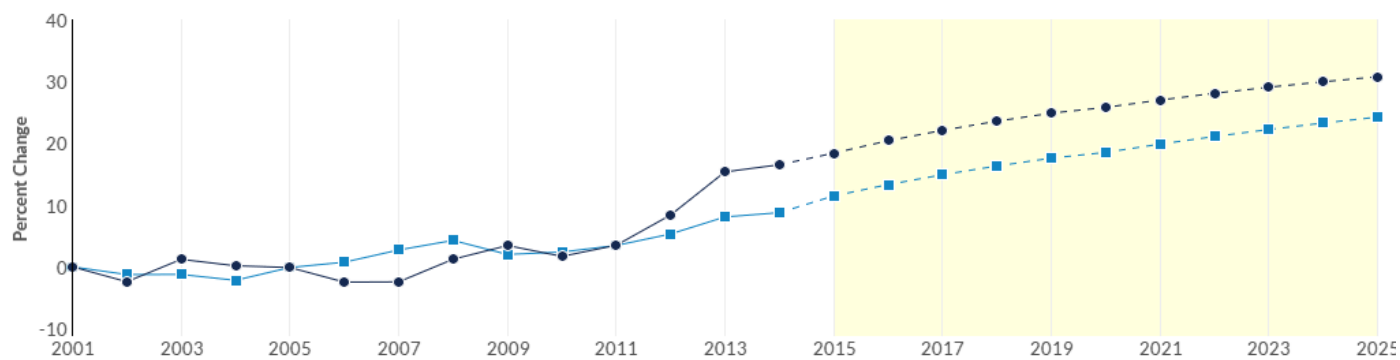
\$15.17/hr

75th Percentile Earnings



Occupation	25th Percentile Earnings	Median Earnings	75th Percentile Earnings
Agricultural Engineers (17-2021)	\$25.19	\$31.03	\$39.10
Environmental Engineers (17-2081)	\$29.70	\$36.72	\$48.10
Agricultural Equipment Operators (45-2091)	\$10.40	\$11.97	\$14.17

Regional Trends



Region	2015 Jobs	2025 Jobs	Change	% Change
Region	2,993	3,305	312	10.4%
State	25,893	28,859	2,966	11.5%

Regional Breakdown



County	2025 Jobs
San Joaquin County, CA	1,429
Merced County, CA	1,084
Stanislaus County, CA	792

Job Postings Summary

12

Unique Postings (Sep 2015)
18 Total Postings

2 : 1

Posting Intensity (Sep 2015)

Regional Average: 7 : 1

There were 18 total job postings for 3 *Occupations* in September 2015, of which 12 were unique. These numbers give us a Posting Intensity of 2-to-1, meaning that for every 2 postings there is 1 unique job posting.

This is lower than the Posting Intensity for all other occupations and companies in the region (7-to-1), indicating that companies may not be trying as hard to hire this position.

Occupation Gender Breakdown



Gender	2015 Jobs	2015 Percent	
● Males	2,043	68.3%	
● Females	950	31.7%	

Occupation Age Breakdown



Age	2015 Jobs	2015 Percent	
14-18	74	2.5%	
19-24	343	11.5%	
25-34	659	22.0%	
35-44	630	21.0%	
45-54	607	20.3%	
55-64	409	13.7%	
65+	271	9.0%	

Occupation Race/Ethnicity Breakdown



Race/Ethnicity	2015 Jobs	2015 Percent	
Hispanic or Latino	1,807	60.4%	
White	884	29.5%	
Asian	186	6.2%	
Black or African American	83	2.8%	
Two or More Races	16	0.5%	
Native Hawaiian or Other Pacific Islander	9	0.3%	
American Indian or Alaska Native	8	0.3%	

Occupational Programs

2	17	140
Programs (2014)	Completions (2014)	Openings (2014)
CIP Code	Program	Completions (2014)
14.1401	Environmental/Environmental Health Engineering	17
14.0301	Agricultural Engineering	0

Industries Employing 3 Occupations

Industry	Occupation Group Jobs in Industry (2015)	% of Occupation Group in Industry (2015)	% of Total Jobs in Industry (2015)
Farm Labor Contractors and Crew Leaders	985	32.9%	7.9%
Crop Production	809	27.0%	3.6%
Postharvest Crop Activities (except Cotton Ginning)	366	12.2%	7.9%
Animal Production and Aquaculture	358	12.0%	3.5%
Soil Preparation, Planting, and Cultivating	85	2.8%	6.9%

Appendix A - Data Sources and Calculations

Location Quotient

Location quotient (LQ) is a way of quantifying how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to the nation. It can reveal what makes a particular region unique in comparison to the national average.

Occupation Data

EMSI occupation employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry.

Completers Data

The completers data in this report is taken directly from the national IPEDS database published by the U.S. Department of Education's National Center for Education Statistics.

Institution Data

The institution data in this report is taken directly from the national IPEDS database published by the U.S. Department of Education's National Center for Education Statistics.

Industry Data

EMSI industry data have various sources depending on the class of worker. (1) For QCEW Employees, EMSI primarily uses the QCEW (Quarterly Census of Employment and Wages), with supplemental estimates from County Business Patterns and Current Employment Statistics. (2) Non-QCEW employees data are based on a number of sources including QCEW, Current Employment Statistics, County Business Patterns, BEA State and Local Personal Income reports, the National Industry-Occupation Employment Matrix (NIOEM), the American Community Survey, and Railroad Retirement Board statistics. (3) Self-Employed and Extended Proprietor classes of worker data are primarily based on the American Community Survey, Nonemployer Statistics, and BEA State and Local Personal Income Reports. Projections for QCEW and Non-QCEW Employees are informed by NIOEM and long-term industry projections published by individual states.

Staffing Patterns Data

The staffing pattern data in this report are compiled from several sources using a specialized process. For QCEW and Non-QCEW Employees classes of worker, sources include Occupational Employment Statistics, the National Industry-Occupation Employment Matrix, and the American Community Survey. For the Self-Employed and Extended Proprietors classes of worker, the primary source is the American Community Survey, with a small amount of information from Occupational Employment Statistics.

State Data Sources

This report uses state data from the following agencies: California Labor Market Information Department