

**Apprenticeship Program Summary Sheet**  
for  
**El Camino Community College District**

**Division of Apprenticeship Standards (DAS)**

To: Chief Eric Rood

From:

CC:

Date: March 26, 2020

Program

Name: El Camino Community College District

Industry(s): Aerospace Manufacturing

DAS File No.

**ACTIONS**

**Proposed New Apprentice Program**

**LIST OF LABOR ORGANIZATIONS REPRESENTING ANY OF THE APPRENTICES**

None

**LIST OF EMPLOYER(S)**

Northrop Grumman Corporation

## Apprenticeship Program Summary Sheet

For

**El Camino Community College District**

### DISCLAIMER OF INTEREST IN THE BUILDING TRADES AND DISPATCH RESTRICTION

*The El Camino Community College District Apprenticeship Program is not intended to train in the building and construction trades within the meaning of Labor Code section 3075, and is not eligible to dispatch apprentices to projects with public works, prevailing wage, or skilled and trained workforce requirements.*

*The S El Camino Community College District Apprenticeship Program will train its apprentices to serve as fulltime employees for employers subscribing to these standards*

### SUMMARY

The El Camino Community College District Apprenticeship Training Committee oversees the apprenticeship program herein and seeks approval as a California-registered Apprenticeship Program from the Department of Industrial Relations, Division of Apprenticeship Standards. The unilateral single employer program committee offers the following apprenticeable occupation listed below.

The apprenticeable occupation within the program consists of the following related classroom instruction and hours of on-the-job training.

Aerospace Electronics Technician	RSI 144 hours per year	Competency-Based
Aerospace CNC Machining Technician	RSI 144 hours per year	Competency-Based
Aerospace Electromechanical Technician	RSI 144 hours per year	Competency-Based

<u>PROPOSED OCCUPATION(s) &amp; WAGE RATES(s)</u>	<u>O*NET CODE</u>
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Aerospace Electronics Technician	O*Net: 17-3023.01
Aerospace CNC Machining Technician	O*Net: 51-4034.00
Aerospace Electromechanical Technician	O*Net: 17-3024.00
Aerospace Electronics Technician Apprentice Starting Wage	\$15.00 per hour
Aerospace Electronics Technician Journeyworker Wage	\$17.00 per hour
Aerospace CNC Machining Technician Apprentice Starting Wage	\$15.00 per hour
Aerospace CNC Machining Technician Journeyworker Wage	\$17.00 per hour
Aerospace Electromechanical Technician Apprentice Starting Wage	\$15.00 per hour
Aerospace Electromechanical Technician Journeyworker Wage	\$17.00 per hour

Program sponsors may pay at or above the minimum wage cited on the approved wage schedule, but never below the state or local minimum wage.

STATE OF CALIFORNIA  
DEPARTMENT OF INDUSTRIAL  
RELATIONS DIVISION OF APPRENTICESHIP STANDARDS  
DAS-DOL Cover Sheet

DAS FILE NO.  
DISTRICT NO  
NEW X

Apprenticeship Standards Incorporating and Adopting  
U.S. Department of Labor, Office of Apprenticeship Approved Standards

NAME OF EMPLOYER (PROGRAM SPONSOR)

El Camino Community College District (referred to as ECC)  
16007 Crenshaw Blvd, Torrance, CA 90506

OCCUPATIONS

Aerospace Electronics Technician  
Aerospace CNC Machining Technician  
Aerospace Electromechanical Technician

TELEPHONE NO..

310-660-3593

COUNTY Los Angeles

O\*Net: 17-3023.01

O\*Net: 51-4034.00

O\*Net: 17-3024.00

See Attachment "A" -- Approved Standards by U.S. Department of Labor Office of  
Apprenticeship that are herein incorporated adopted into these Standards

1. Purpose and Policy – Labor Code §3075.1; CCR §205 (e & g), §206, §212.2, §218  
The parties hereto declare it their purpose and policy to incorporate the attached standards approved by U.S. Department of Labor Office of Apprenticeship to establish an organized, planned system of apprenticeship, conducted as an education-sponsored, employer-based undertaking. All provisions in the U.S. Department of Labor Office of Apprenticeship Standards attached hereto, that do not conflict with California law or create a higher standard than the California Apprenticeship laws and regulations shall be incorporated, adopted and agreed upon under the Shelley-Maloney Apprentice Labor Standards Act of 1939, as amended, to govern the employment and training of apprentices in the trade, craft or occupation defined herein, to become effective upon their approval under the California standards. In case of conflict of law, California Law shall prevail. No Section of these Standards of Apprenticeship shall be construed as permitting violation of any Federal Law or Regulations and the State of California Law or Regulations. When required by California Statute or Regulation, or by Section I – Program Administration of the attached U.S. Department of Labor Office of Apprenticeship Standards, there is hereby established the **ECC Master Committee** named master apprenticeship committee. The committee shall consist of at least three (3) members representing parties' signatory hereto, including employers who subscribe hereto participating in this program, an "Employer Subscription Agreement" (DAS-852) Attachment C. Committee members will be selected as outlined in the rules & regulations here to attached as Attachment D. In addition, there shall be advisors of the committee which shall consist of one apprenticeship consultant representing the Division of Apprenticeship Standards, one advisor from the Local Education Agency, and such other advisors as the committee shall determine. Such advisors and the apprenticeship consultant shall act without vote. These standards shall apply to the organizations signatory hereto, their members, to other employers who subscribe hereto participating in this program, an "Employer Subscription Agreement" (DAS-852) Attachment C, will be provided to specify the information particular to that employer as noted herein, including the option to waive or

offer participation on the committee, employer committee members will be selected as outlined in the rules & regulations.

2. Craft, Trade, Occupation – Labor Code §3078 (c); CCR §212 (a,1)

The approved occupations are set forth in the U.S. Department of Labor Office of Apprenticeship

Standards attached to this California State standard. Additional occupations may be added or deleted by the above named sponsor by first submitting the proposed change(s) to the U.S. Department of Labor Office of Apprenticeship Standards. Once the U.S. Department of Labor Office of Apprenticeship Standards approves the change, the revised standards may be submitted to the California Division of Apprenticeship Standards (DAS) for approval of the Administrator of Apprenticeship.

3. Occupations

The occupational supplement(s) included in the attached U.S. Department of Labor Office of Apprenticeship Standards set forth the terms of the occupation, ratio, work processes, and related supplemental instruction for each individual occupation.

4. Responsibilities of Program Sponsor – CCR §212

The program sponsors are responsible for the administration and enforcement of all aspects of a Registered Apprenticeship program. Sponsor means any person, association, committee, or organization operating an apprenticeship program and in whose name the program is (or is to be) registered or approved. Sponsors will carry out the responsibilities and duties required of a Program Sponsor as described in Section I – Program Administration of the attached U.S. Department of Labor Office of Apprenticeship Standards.

In addition, the Sponsor(s) agree to:

- (1) administer and enforce the standards as approved;
- (2) establish rules and regulations governing the program and any apprenticeship committee if established;
- (3) The recruitment, selection, employment, and training of apprentices during their apprenticeship, shall be without discrimination because of race, color, religion, national origin or sex. The sponsor will take affirmative action to provide equal opportunity in apprenticeship for both minorities and women as required under Title 29 of the Code of Federal Regulations, Part 30, and by the California Plan for Equal Opportunity in Apprenticeship and by the California Code of Regulations, Title 8, Chapter 215;
- (4) provide training scheduled herein under competent trainers, including safety training through the program and first aid training, either in conjunction with the apprentices, related instruction classes or otherwise as appropriate;
- (5) arrange for Related and Supplemental Instruction pursuant to LC 3074;
- (6) have a Local Education Agency (L.E.A.) provide a letter approving the Related and Supplemental Instruction pursuant to LC 3074, 210212 (a, 7) (proof attached);
- (7) maintain a record of each apprentice's work training, related instruction and progress therein;

- (8) file a copy of each apprentice agreement with the Secretary of the California Apprenticeship Council;
- (9) provide training in the recognition of illegal discrimination and sexual harassment;
- (10) participate in the development of the training criteria;
- (11) submit an annual Self-Assessment Review and Program Improvement Plan annually to the Chief of DAS.

5. Responsibilities of Program Employer Subscriber's – CCR §212

- (1) administer and enforce the standards as approved;
- (2) The recruitment, selection, employment, and training of apprentices during their apprenticeship, shall be without discrimination because of race, color, religion, national origin or sex. The sponsor will take affirmative action to provide equal opportunity in apprenticeship for both minorities and women. The sponsor select apprentices on the basis of qualifications alone, through fair and impartial procedures applied uniformly to all applicants will operate the apprenticeship program as required under Title 29 of the Code of Federal Regulations, Part 30, and by the California Plan for Equal Opportunity in Apprenticeship and by the California Code of Regulations, Title 8, Chapter 2;
- (3) provide reasonably continuous employment to all apprentices in its employ;
- (4) provide the diversified work training scheduled herein under competent trainers, including safety training through the program and first aid training, either in conjunction with the apprentices, related instruction classes or otherwise as appropriate;
- (5) maintain a record of each apprentice's work training, related instruction and progress therein;
- (6) file a copy of each apprentice agreement with the Secretary of the California Apprenticeship Council;
- (7) grant apprentices credit for previous experience;
- (8) provide training in the recognition of illegal discrimination and sexual harassment;
- (9) participate in the development and comply with training criteria where such have been adopted;

6. Apprentice Agreements Labor Code – Labor Code § 3077, 3078; CCR § 206

Apprentices shall be at least 16 years of age. If the apprentice is under 18 years of age, the apprentice's parent or guardian must sign the agreement. When the period of training extends beyond 18, the apprentice agreement shall likewise be binding to such a period as may be covered. An apprentice is one who has been qualified and approved by the subscribing employer, signed an individual apprentice agreement with the program sponsor under these standards, which agreement has been approved by the Administrator or his duly authorized representative and filed with the California Apprenticeship Council. The standards shall be a part of the apprenticeship agreement. Apprentices shall be furnished a copy of the standards or given an opportunity to read them before indenture. The Administrator shall cancel apprentice agreements during the probationary period at the request in writing of either party; after the probationary period, agreements may be terminated by the Administrator by mutual consent of all the parties or cancelled for good

and sufficient reason. An apprentice agreement shall remain in effect during a lay-off unless cancelled. [See Attachment “B” – California Apprenticeship Agreement (DAS-1)].

#### 7. Hours and Working Conditions – CCR §208 (b) (c, 4, 6), §212

The regular workday, workweek and other working conditions for apprentices shall conform to all applicable California laws and regulations. The employers must pay the higher hourly wage of either the Federal minimum wage, State minimum wage or the Living wage enacted in the County or City where the employer is located. Overtime shall not interfere with or impair training or schooling nor be detrimental to the health and safety of the apprentice. Establish a mechanism to rotate apprentices from work processes to work processes to assure complete training.

#### 8. Wages and Wage Progression – Labor Code §3078; CCR §208 (a) (c-1, 2, 5, 6), §212 (a 5)

The wages shall be a progressively increasing wage, employee benefits and other compensation as set by Section CCR §208. Hours of related instruction and required school time need not be compensated.

#### 9. Responsibilities of Apprentices – CCR §205 (c, e, i, & m), § 212(3), 224- CCR 212 (3)

Each apprentice shall satisfactorily perform all work and learning assignments, and complete a course of related instruction, as determined in accordance with California Labor Code Section 3078(d). There shall be no liability on the part of the employer for an injury sustained by an apprentice engaged in schoolwork at a time when the employment of the apprentice has been temporarily or permanently terminated.

#### 10. Disciplining of Apprentice – Labor Code §3071; CCR §212 (b, 8), §213, § 218

All controversies or differences concerning the apprentice agreement, which cannot be adjusted locally, shall be submitted to the Administrator of Apprenticeship for determination.

#### 11. Certificate of Completion - Labor Code §3071, §3078, §3092; CCR §§ 212, 224

The California Apprenticeship Council will issue a Certificate of Completion to apprentices upon receipt of competent evidence of their satisfactory completion of apprenticeship hereunder.

#### 12. Modification of Standards - Labor Code § 3073, 3078; CCR § 212 (b) (13)

These Standards shall be modified to conform to any changes in prevailing practices, conditions and wages in the area and the industry when such changes occur. Requests of the program sponsor for modification are subject to the approval of the Administrator of Apprenticeship.

#### 13. Where the program sponsors establish rules and regulations for governing of the apprentices in the program, a copy of such shall be provided to each apprentice.

14. Where applicable if an employer has a collective bargaining agreement with a labor organization applicable to these occupation(s), approval by the labor organization will be affixed to the Employer Subscription Agreement (DAS-752).

15. The foregoing standards are hereby agreed to and adopted on: June 20, 2020

16. Sponsoring Organization Designee:

By /s/ Jose Anaya Dean, Community Advancement

# **STANDARDS OF APPRENTICESHIP**

DEVELOPED BY

## **El Camino Community College District dba El Camino College**

Torrance, CA 90506

FOR THE FOLLOWING OCCUPATION(S):

IT Lab Technician (aka Aerospace Electronics Technician)

O\*NET-SOC CODE: 17-3023.01 RAPIDS CODE: 0169CB

CNC Operator – Milling and Turning (aka Aerospace CNC Machining Technician)

O\*NET-SOC CODE: 51-4034.00 RAPIDS CODE: 1094CB

Electromechanical Technician (aka Aerospace Electromechanical Technician)

O\*NET-SOC CODE: 17-3024.00 RAPIDS CODE: 0167CB

APPROVED BY

/s/ Nora Carlton

Nora L. Carlton, State Director / California  
U.S. DEPARTMENT OF LABOR / OFFICE OF APPRENTICESHIP  
Sacramento, California

REGISTRATION DATE: August 30, 2019

REVISED: June 29, 2020

RAPIDS REGISTRATION NUMBER: 2019-CA-74015

REGISTERED AS PART OF THE NATIONAL APPRENTICESHIP PROGRAM  
IN ACCORDANCE WITH THE BASIC STANDARDS OF APPRENTICESHIP  
ESTABLISHED BY THE SECRETARY OF LABOR

## **FOREWORD**

These El Camino Community College District, dba El Camino College (herein referred to as El Camino College) apprenticeship standards have as their objective the training of IT Lab Technician (aka Aerospace Electronics Technician), CNC Operator – Milling and Turning (aka Aerospace CNC Machining Technician), and Electromechanical Technician (aka Aerospace Electromechanical Technician) occupations as described within in all phases of that industry. The sponsor recognizes that in order to accomplish this, there must be well-developed on-the-job learning combined with related instruction.

This recognition has resulted in the development of these standards of apprenticeship. They were developed in accordance with the basic standards recommended by the U.S. Department of Labor, Office of Apprenticeship, as a basis from which the sponsor can work to establish an apprenticeship training program that meets the particular needs of the area.

## **SECTION I – PROGRAM ADMINISTRATION**

Program Sponsors are responsible for the administration of all aspects of a Registered Apprenticeship program. Sponsor means any person, association, committee, or organization operating an apprenticeship program and in whose name the program is (or is to be) registered or approved.

### **Responsibilities of the Sponsor**

- A. Cooperate in the selection of apprentices as outlined in this program.
- B. Ensure that all apprentices are under written apprenticeship agreements.
- C. Review and recommend apprenticeship activities in accordance with this program.
- D. Establish the minimum standards of education and experience required of apprentices.
- E. Register the local apprenticeship standards with the Registration Agency.
- F. Hear and resolve all complaints of violations of apprenticeship agreements.
- G. Arrange evaluations of apprentices' progress in manipulative skills and technical knowledge.
- H. Maintain records of all apprentices, showing their education, experience, and progress in learning the occupation.
- I. Certify to the Registration Agency that apprentices have successfully completed their apprenticeship program.
- J. Notify, within 45 days, the Registration Agency of all new apprentices to be registered, credit granted, suspensions for any reason, reinstatements, extensions, completions and cancellations with explanation of causes
- K. Supervise all the provisions of the local standards and be responsible, in general, for the successful operation of the standards by performing the

duties here listed. Cooperate with public and private agencies, which can be of assistance in obtaining publicity to develop public support of apprenticeship. Keep in contact with all parties concerned, including apprentices, employers, and journeyworkers.

- L. Provide each apprentice with a copy of these standards, along with any applicable written rules and policies. Require the apprentice to sign an acknowledgment receipt of same. Follow this procedure whenever revisions or modifications are made to the rules and policies.
  - M. When notified that an apprentice's related instruction or on-the-job progress is found to be unsatisfactory, the sponsor will determine whether the apprentice should continue in a probationary status and may require the apprentice to repeat a process or series of processes before advancing to the next wage classification. Should it be found in the course of this determination that the apprentice does not have the ability or desire to continue the training to become a journeyworker, the sponsor will, after the apprentice has been given adequate assistance and opportunity for corrective action, terminate the apprenticeship agreement, as provided in 29 CFR § 29. 7(h)(1)(2)(i) and (ii).
  - N. The sponsor will provide each registered apprentice with continuous employment sufficient to provide the opportunity for completion of his or her apprenticeship program. If the sponsor is unable to fulfill its training and/or employment obligation in conformance with these standards, the sponsor will, per Section XXIII of these standards and with the apprentice's consent, make a good-faith effort to facilitate a transfer of the apprentice to another registered sponsor for completion of the apprenticeship.
1. If conditions of business make it necessary to temporarily suspend the period of apprenticeship. Apprentices suspended for this reason will be given the opportunity to resume their active apprenticeships before any additional apprentices are employed. The suspension and reinstatement of apprentices shall be done in relation to retention of the most advanced apprentice and in accordance with the company policy for breaks in seniority.

## **SECTION II - EQUAL OPPORTUNITY PLEDGE**

The El Camino Community College District, and its employer-partners, will not discriminate against apprenticeship applicants or apprentices based on race, color, religion, national origin, sex (including pregnancy and gender identity), sexual orientation, genetic information, or because they are an individual with a disability or a person 40 years old or older. The El Camino Community College District, and its employer-partners, will take affirmative action to provide equal opportunity in apprenticeship and will operate the apprenticeship program as required under Title 29 of the Code of Federal Regulations, part 30.

## **SECTION III - AFFIRMATIVE ACTION PLAN AND SELECTION PROCEDURES**

The sponsor's procedures for selection of apprentices (Appendix D) must be included in the written plan for Standards of Apprenticeship submitted to and approved by the Registration Agency, as required under § 29.5. Within two years of program registration sponsors with five or more registered apprentices are required to adopt an affirmative action plan (Appendix C), which will become part of these standards of apprenticeship. However, the Office of Apprenticeship encourages the development of these two plans for all programs regardless of apprentice numbers. For programs with fewer than five apprentices, these plans are not required, and the sponsor may continue to select apprentices in conformance with its current human resources and equal employment opportunity hiring policies.

## **SECTION IV - QUALIFICATIONS FOR APPRENTICESHIP**

Applicants will meet the following minimum qualifications. These qualification standards, and the score required on any standard for admission to the applicant pool, must be directly related to job performance, as shown by a statistical relationship between the score required for admission to the pool and performance in the apprenticeship program:

1. Age  
Minimum qualifications required by the sponsor for persons entering the apprenticeship program, with an eligible starting age not less than 16 years.
2. Education  
A high school diploma, General Educational Development (GED) equivalency or other high school equivalency credential is required. Applicants must provide an official transcript for high school and all GED records must be submitted, if applicable. Applicants affiliated with recognized pre-apprenticeship or school-to-apprenticeship programs recognized by this program must have completed at least the 10th grade of high school with a GPA of 2.0 or higher. For currently enrolled high school students, applying to a high school registered apprenticeship program, the high school diploma or GED requirement is waived.
3. Physical  
Applicants will be physically capable of performing the essential functions of the apprenticeship program, with or without a reasonable accommodation, and without posing a direct threat to the health and safety of the individual or others.
4. Others  
Applicants must have transportation (e.g. – public and/or private) to the job and related instruction as appropriate; and must possess such speaking, reading, and comprehension abilities as may be essential for reading and understanding written and oral instructions applicable to their occupation as defined in the job description.

## **SECTION V - APPRENTICESHIP AGREEMENT**

After an applicant for apprenticeship has been selected, but before employment as an apprentice or enrollment in related instruction, the apprentice will be covered by a written apprenticeship agreement (Appendix B) which can be submitted electronically through the Registered Apprenticeship Partners Information Data System, using the Apprentice Electronic Registration process by the sponsor and the apprentice and approved by and registered with the Registration Agency. Such agreement will contain a statement making the terms and conditions of these standards a part of the agreement as though expressly written therein. The sponsor shall provide a copy of the apprenticeship agreement to the apprentice, the Registration Agency, and the employer. An additional copy will be provided to the veteran's state approving agency for those veteran apprentices desiring access to any benefits to which they are entitled.

Prior to signing the apprenticeship agreement, each selected applicant will be given an opportunity to read and review these standards, the sponsor's written rules and policies, and the apprenticeship agreement. The Registration Agency will be advised within 45 days of the execution of each apprenticeship agreement and will be given all the information required for registering the apprentice.

## **SECTION VI – SUPERVISION OF APPRENTICES AND RATIOS**

No apprentice shall work without proper or adequate supervision of the journeyworker.

For the purpose of these apprenticeship standards, adequate or proper supervision of the apprentice means the apprentice is under the supervision of a fully qualified journeyworker or supervisor at all times who is responsible for making work assignments, providing OJL, and ensuring safety at the worksite.

To adequately or properly supervise an apprentice does not mean the apprentice must be within eyesight or reach of the supervisor, but that the supervisor knows what the apprentice is working on; is readily available to the apprentice; and is making sure the apprentice has the necessary instruction and guidance to perform tasks safely, correctly, and efficiently.

The sponsor shall establish a numeric ratio of apprentices to fully proficient workers (journeyworkers) consistent with proper supervision, training, safety, and continuity of employment throughout the apprenticeship. The ratio language must be specific and clearly described as to its application to the jobsite, workforce, department, or plant. The ratio of apprentices to fully proficient workers (journeyworkers) will be as noted in Appendix A.

## **SECTION VII - TERM OF APPRENTICESHIP**

The term of the occupation will be as specified on the Appendix A for each occupation included in these standards with the required OJL or competence attainment

supplemented by the required hours of related instruction as stated on the Work Process Schedule and Related Instruction Outlines (Appendix A).

The sponsor may utilize a career lattice as a pathway for apprentices to move upward in the organization, which may or may not include an interim credential leading to the Certificate of Completion of Apprenticeship or career lattice credential, if applicable.

## **SECTION VIII - PROBATIONARY PERIOD**

Every applicant selected for apprenticeship will serve a probationary period. The probationary period shall not exceed 25 percent of the length of the program or 1 year, whichever is shorter. The probationary period will be stated for each occupation in Appendix A.

During the probationary period, either the apprentice or the sponsor may terminate the apprenticeship agreement, without stated cause, by notifying the other party in writing. The records for each probationary apprentice will be reviewed prior to the end of the probationary period. Records may consist of periodic reports regarding progression made in both the OJL and related instruction, and any disciplinary action taken during the probationary period.

Any probationary apprentice evaluated as satisfactory after a review of the probationary period will be given full credit for the probationary period and continue in the program.

After the probationary period, the apprenticeship agreement may be cancelled at the request of the apprentice or may be suspended or cancelled by the sponsor for reasonable cause after documented due notice to the apprentice and a reasonable opportunity for corrective action. In such cases, the sponsor will provide written notice to the apprentice and to the Registration Agency of the final action taken.

## **SECTION IX - HOURS OF WORK**

Apprentices will generally work the same hours as fully proficient workers (journeyworkers), except that no apprentice will be allowed to work overtime if it interferes with attendance in related instruction classes. Apprentices who do not complete the required hours of OJL during a given segment will have the term of that segment extended until they have accrued the required number of hours of training.

## **SECTION X - APPRENTICE WAGE PROGRESSION**

Apprentices will be paid a progressively increasing schedule of wages and fringe benefits during their apprenticeship based on the acquisition of increased skill and competence on the job and in related instruction. Before an apprentice is advanced to the next segment of training or to fully proficient or journeyworker status, the sponsor will evaluate all progress to determine whether advancement has been earned by satisfactory performance in OJL and in related instruction courses. In determining whether satisfactory progress has been made, the sponsor will be guided by the work experience and related instruction records and reports.

The progressive wage schedule and fringe benefits will be an increasing percentage of the fully proficient or journeyworker wage rate. The percentages that will be applied to the applicable fully proficient or journeyworker rate are shown on the attached Work Process Schedule and Related Instruction Outline (Appendix A). In no case will the starting wages of apprentices be less than that required by any minimum wage law that may be applicable.

## **SECTION XI - CREDIT FOR PREVIOUS EXPERIENCE**

The sponsor may grant credit toward the term of apprenticeship to new apprentices. Credit will be based on demonstration of previous skills or knowledge equivalent to those identified in these standards.

Apprentice applicants seeking credit for previous experience gained outside the supervision of the sponsor must submit the request at the time of application and furnish such records, affidavits, and other documents to substantiate the claim. An applicant who is a veteran and who wishes to receive consideration for military training and/or experience must submit a DD-214. Applicants requesting credit for previous experience who are selected into the apprenticeship program will start at the beginning wage rate. The request for credit will be evaluated and a determination made by the sponsor during the probationary period, when actual on-the-job and related instruction performance can be examined. Prior to completion of the probationary period, the amount of credit to be awarded will be determined after review of the apprentice's previous work and training/education record and evaluation of the apprentice's performance and demonstrated skill and knowledge during the probationary period.

An apprentice granted credit will be advanced to the wage rate designated for the period to which such credit accrues. The Registration Agency will be advised of any credit granted and the wage rate to which the apprentice is advanced. The granting of advanced standing will be uniformly applied to all apprentices.

## **SECTION XII - WORK EXPERIENCE**

During the apprenticeship, the apprentice will receive OJL and related instruction in all phases of the occupation necessary to develop the skill and proficiency of a skilled journeyworker. The OJL will be under the direction and guidance of the apprentice's supervisor.

## **SECTION XIII - RELATED INSTRUCTION**

Every apprentice is required to participate in coursework related to the occupation as outlined in Appendix A. A minimum of 144 hours of related instruction is recommended for each year of the apprenticeship. Apprentices agree to take such courses as the sponsor deems advisable. The sponsor will secure the instructional aids and equipment it deems necessary to provide quality instruction. In cities, towns, or areas having no vocational schools or other schools that can furnish related instruction, the sponsor may require apprentices to complete the related instruction requirement through electronic media or other instruction approved by the Registration Agency.

The Sponsor, its employer-partners, will determine the best method of related instruction and the appropriate provider of that instruction.

Apprentices will not be paid for hours spent attending related instruction classes outside of normal work hours.

The sponsor will inform each apprentice of the availability of college credit, as applicable, for successful completion of this program.

Any apprentice who is absent from related instruction will satisfactorily complete all coursework missed before being advanced to the next period of training. In cases of failure of an apprentice to fulfill the obligations regarding related instruction without due cause, the sponsor will take appropriate disciplinary action and may terminate the apprenticeship agreement after due notice to the apprentice and opportunity for corrective action.

To the extent possible, related instruction will be closely correlated with the practical experience and training received on the job. The sponsor will monitor and document the apprentice's progress in related instruction classes.

The sponsor will secure competent instructors whose knowledge, experience, and ability to teach will be carefully examined and monitored. The sponsor may require the instructors to attend instructor training to meet the requirements of 29 CFR § 29.5(b)(4)(i)(ii) or state regulations.

## **SECTION XIV - SAFETY, HEALTH AND ANTI-HARASSMENT TRAINING**

All apprentices will receive instruction in safe and healthful work practices both on the job and in related instruction that are in compliance with the Occupational Safety and Health Administration standards promulgated by the Secretary of Labor under 29 U.S.C. 651 et seq., as amended, or state standards that have been found to be at least as effective as the federal standards.

All apprentices and individuals connected with the administration or operation of the apprenticeship program, including employers and journey workers who regularly work with apprentices will receive anti-harassment training, in order to provide for a culture of equality and fairness.

## **SECTION XV - MAINTENANCE OF RECORDS**

Program sponsors are responsible for maintaining, at a minimum, the following records:

- summary of the qualifications of each applicant;
- basis for evaluation and for selection or rejection of each applicant;
- records pertaining to interview;
- the original application;
- records of each apprentice's OJL;
- related instruction reviews and evaluations;
- progress evaluations;
- record of job assignments, promotions, demotions, layoffs, or terminations, rates of pay; and
- any other actions pertaining to the apprenticeship

Program sponsors will also maintain all records relating to apprenticeship applications (whether selected or not), including, but not limited to, the sponsor's outreach, recruitment, interview, and selection process. Such records will clearly identify minority and female (minority and nonminority) applicants and must include, among other things, the basis for evaluation and for selection or rejection of each applicant. For a complete list of records that each sponsor is required to maintain under 29 CFR § 30, please refer to 29 CFR § 30.12.

All such records are the property of the sponsor and will be maintained for a period of five years from the date of last action. They will be made available to the Registration Agency upon request.

## **SECTION XVI - CERTIFICATE OF COMPLETION OF APPRENTICESHIP**

Upon satisfactory completion of the requirements of the apprenticeship program as established in these Standards, the Sponsor will so certify to the Registration Agency and request the awarding of a Certificate of Completion of Apprenticeship to the completing apprentice(s). Such requests may be completed electronically using the Registered Apprenticeship Partners Information Data System (RAPIDS) or in writing using the supplied U. S. Department of Labor, ETA, Office of Apprenticeship, Application for Certification of Completion of Apprenticeship Form in (Appendix B), accompanied by the appropriate documentation for both on-the-job learning and the related instruction as may be required by the Registration Agency.

Certificate of Training (If applicable)

A Certificate of Training may be requested from and issued by the U.S. Department of Labor's Office of Apprenticeship, Office of the Administrator (the Registration Agency), only for a registered apprentice who has been certified by the sponsor as having successfully met the requirements to receive an interim credential as identified in these standards. The Registration Agency may require that a record of completed OJL and related instruction for the apprentice accompany such requests.

## **SECTION XVII - NOTICE TO REGISTRATION AGENCY**

The Registration Agency must be notified within 45 days of any apprentice action - e.g., registered, reinstated, extended, modified, granted credit, completed, transferred, suspended, canceled - and a statement of the reasons therefor.

## **SECTION XVIII - REGISTRATION, CANCELLATION, AND DEREGISTRATION**

These standards will, upon adoption by the sponsor, be submitted to the Registration Agency for approval. Such approval will be acquired before implementation of the program.

The sponsor reserves the right to discontinue at any time the apprenticeship program set forth herein. The sponsor will notify the Registration Agency within 45 days in writing of any decision to cancel the program.

The Registration Agency may initiate deregistration of these standards for failure of the sponsor to abide by the provisions herein. Such deregistration will be in accordance with the Registration Agency's regulations and procedures.

The sponsor will notify each apprentice of the cancellation of the program and the effect of same. If the apprenticeship program is cancelled at the sponsor's request, the sponsor will notify the apprentice(s) within 15 days of the date of the Registration Agency's acknowledgment of the sponsor's request. If the Registration Agency orders the deregistration of the apprenticeship program, the sponsor will notify the apprentice(s) within 15 days of the effective date of the order. This notification will conform to the requirements of 29 CFR § 29.8.

## **SECTION XIX - AMENDMENTS AND MODIFICATIONS**

These standards may be amended or modified at any time by the sponsor provided that no amendment or modification adopted will alter any apprenticeship agreement in force at the time without the consent of all parties. Such amendment or modification will be submitted to the Registration Agency for approval and registration prior to being placed in effect. A copy of each amendment or modification adopted will be furnished to each apprentice to whom the amendment or modification applies.

## **SECTION XX - ADJUSTING DIFFERENCES; COMPLAINT PROCEDURE**

The sponsor will have full authority to enforce these standards. Its decision will be final and binding on the employer, the sponsor, and the apprentice, unless otherwise noted below.

If an applicant or an apprentice believes an issue exists that adversely affects his/her participation in the apprenticeship program or violates the provisions of the apprenticeship agreement or standards, the applicant or apprentice may seek relief through one or more of the following avenues, based on the nature of the issue:

29 CFR § 29.7(k)

The sponsor will hear and resolve all complaints of violations concerning the apprenticeship agreement and the registered apprenticeship standards for which written notification is received within 15 days of the alleged violations. The sponsor will make such rulings as it deems necessary in each individual case within 30 days of receiving the written notification. Either party to the apprenticeship agreement may consult with the Registration Agency for an interpretation of any provision of these standards over which differences occur. The name and address of the appropriate authority to receive, process, and dispose of complaints is:

Jose Anaya  
Dean, Community Advancement  
El Camino Community College District  
13430 Hawthorne Blvd.  
Hawthorne, CA 90250

310.225.8265  
janaya@elcamino.edu

## 29 CFR § 30.14

Any individual who believes that he or she has been or is being discriminated against on the basis of race, color, religion, national origin, sex, sexual orientation, age (40 or older), genetic information, or disability with regard to apprenticeship, or who believes he or she has been retaliated against as described in § 30.17, may, personally or through an authorized representative, file a written complaint with the Registration Agency with whom the apprenticeship program is registered or directly with the EEOC, or State fair employment practices agency.

The complaint shall be in writing and shall be signed by the complainant. It must include the name, address, and telephone number of the person allegedly discriminated against, the identity of the respondent (the individual or entity that the complainant alleges is responsible for the discrimination), and a brief description of the circumstances of the failure to apply the equal opportunity standards provided in 29 CFR § 30.

The complaint must be filed not later than 300 days from the date of the alleged discrimination or specified failure to follow the equal opportunity standards. The time may be extended by the Registration Agency for good cause shown.

Complaints of discrimination and failure to follow equal opportunity standards in the apprenticeship program may be filed and processed under 29 CFR § 30 and the procedures set forth above.

The sponsor must provide written notice to all applicants for apprenticeship and all apprentices of their right to file a discrimination complaint and the procedures for doing so.

## **SECTION XXI - TRANSFER OF AN APPRENTICE AND TRAINING OBLIGATION**

The transfer of an apprentice between apprenticeship programs and within an apprenticeship program must be based on agreement between the apprentice and the affected apprenticeship committees or program sponsors and must comply with the following requirements:

- i. The transferring apprentice must be provided a transcript of related instruction and OJL by the committee or program sponsor;
- ii. Transfer must be to the same occupation; and
- iii. A new apprenticeship agreement must be executed when the transfer occurs between the program sponsors.

The apprentice must receive credit from the new sponsor for the training already satisfactorily completed.

## **SECTION XXII - RESPONSIBILITIES OF THE APPRENTICE**

Apprentices, having read these standards formulated by the sponsor, agree to all the terms and conditions contained herein and agree to abide by the sponsor's rules and policies, including any amendments, and to serve such time, perform such manual training, and study such subjects as the sponsor may deem necessary to become a skilled journeyworker.

In signing the apprenticeship agreement, apprentices assume the following responsibilities and obligations under the apprenticeship program:

- A. Maintain and make available such records of work experience and training received on the job and in related instruction as may be required by the sponsor.
- B. Develop and practice safe working habits and work in such a manner as to assure his/her personal safety and that of fellow workers.
- C. Work for the employer to whom the apprentice is assigned for the duration of the apprenticeship, unless the apprentice is reassigned to another employer or the apprenticeship agreement is terminated by the sponsor.

## **SECTION XXIII - TECHNICAL ASSISTANCE**

Technical assistance, such as that from the U.S. Department of Labor's Office of Apprenticeship, recognized state apprenticeship agencies, and vocational schools, may be requested to advise the sponsor.

The sponsor is encouraged to invite representatives from industry, education, business, private organizations, and public agencies to provide consultation and advice for the successful operation of its training program.

## **SECTION XXIV - CONFORMANCE WITH FEDERAL LAWS AND REGULATIONS**

No Section of these Standards of Apprenticeship shall be construed as permitting violation of any Federal Law or Regulation.

## **SECTION XXV - DEFINITIONS**

APPRENTICE: Any individual employed by the employer meeting the qualifications described in the standards of apprenticeship who has signed an apprenticeship

agreement with the local sponsor providing for training and related instruction under these standards and who registers with the Registration Agency.

**APPRENTICE ELECTRONIC REGISTRATION (AER):** An electronic tool that allows for instantaneous transmission of apprentice data for more efficient registration of apprentices and provides program sponsors with a faster turnaround on their submissions and access to their apprenticeship program data

**APPRENTICESHIP AGREEMENT:** The written agreement between the apprentice and the sponsor setting forth the responsibilities and obligations of all parties to the apprenticeship agreement with respect to the apprentice's employment and training under these standards. Each apprenticeship agreement must be registered with the Registration Agency.

**APPRENTICESHIP COMMITTEE (COMMITTEE):** Those persons designated by the sponsor to act as agents for the sponsor in the administration of the program. A non-joint committee, which may also be known as a unilateral committee or (if it includes workers' representatives) a group non-joint committee, has employer representatives but does not have a bona fide collective bargaining agent as a participant.

**CAREER LATTICE:** Career lattice apprenticeship programs include occupational pathways that move an apprentice laterally or upward within an industry. These programs may or may not include an interim credential leading to the Certificate of Completion of Apprenticeship credential.

**CERTIFICATE OF COMPLETION OF APPRENTICESHIP:** The credential issued by the Registration Agency to those registered apprentices certified and documented as having successfully completed the apprentice training requirements outlined in these standards of apprenticeship.

**CERTIFICATE OF TRAINING:** A credential that may be issued by the U.S. Department of Labor's Office of Apprenticeship administrator to those registered apprentices whom the sponsor has certified in writing to the Registration Agency as having successfully met the requirements to receive an interim credential.

**COMPETENCY-BASED OCCUPATION:** An occupation using an apprenticeship approach that requires the attainment of manual, mechanical, or technical skills and knowledge, as specified by an occupation standard and demonstrated by an appropriate written and hands-on proficiency measurement.

**ELECTRONIC MEDIA:** Media that utilize electronics or electromechanical energy for the end user (audience) to access the content. Includes, but is not limited to, electronic storage media, transmission media, the Internet, extranets, lease lines, dial-up lines, private networks, and the physical movement of removable/transportable electronic media and/or interactive distance learning.

**EMPLOYER:** Any person or organization employing an apprentice, whether or not such person or organization is a party to an apprenticeship agreement with the apprentice. A person, business, or company signatory to this sponsor's standards that is responsible for providing hours of work, supervision, wages, and/or benefits to apprentices in its employ as registered under these standards.

**HYBRID OCCUPATION:** An occupation using an apprenticeship approach that measures the individual apprentice's skill acquisition through a combination of a specified minimum number of hours of on-the-job learning and the successful demonstration of competency as described in a work process schedule.

**INTERIM CREDENTIAL:** A credential issued by the Registration Agency, upon request of the appropriate sponsor, as certification of competency attainment by an apprentice.

**JOB CORPS CENTER:** Any of the federally funded Job Corps centers throughout the U.S. and Puerto Rico. Job Corps serves youths and young adults 16-24 years of age. Sponsors that wish to hire Job Corps graduates who are trained in any occupation covered under these standards and who meet the minimum qualifications for apprenticeship may do so via the direct entry provision described in Appendix D: Qualifications and Selection Procedures.

**JOURNEYWORKER:** A worker who has attained a level of skills, abilities, and competencies recognized within an industry as mastery of the skills and competencies required for the occupation. The term may also refer to a mentor, technician, specialist, or other skilled worker who has documented sufficient skills and knowledge of an occupation, either through formal apprenticeship or through practical on-the-job experience and formal training.

**O\*NET-SOC CODE:** The Occupational Information Network (O\*NET) codes and titles are based on the new Standard Occupational Classification (SOC) system mandated by the federal Office of Management and Budget for use in collecting statistical information on occupations. The O\*NET classification uses an 8-digit O\*NET-SOC code. Use of the SOC classification as a basis for the O\*NET codes ensures that O\*NET information can be readily linked to labor market information such as occupational employment and wage data at the national, state, and local levels.

**ON-THE-JOB LEARNING (OJL):** Tasks learned on-the-job in which the apprentice must become proficient before a completion certificate is awarded. The learning must be through structured, supervised work experience.

**PROVISIONAL REGISTRATION:** The 1-year initial provisional approval of newly registered programs that meet the required standards for program registration, after which program approval may be made permanent, continued as provisional, or rescinded following a review by the Registration Agency, as provided for in 29 CFR §§ 29.3(g) and (h).

**REGISTERED APPRENTICESHIP PARTNERS INFORMATION DATA SYSTEM (RAPIDS):** A federal system that provides for the automated collection, retention, updating, retrieval, and summarization of information related to apprentices and apprenticeship programs.

**REGISTRATION AGENCY and FIELD REPRESENTATIVE:** The U.S. Department of Labor's Office of Apprenticeship or a recognized State Apprenticeship Agency that has responsibility for registering apprenticeship programs and apprentices, providing technical assistance, conducting reviews for compliance with 29 CFR §§ 29 and 30, and conducting quality assurance assessments.

The field representative shall mean the person designated by Office of Apprenticeship to service this program. The Registration Agency and field representative identified are the U.S. Department of Labor, Office of Apprenticeship, Harry Dispensa, Apprenticeship Training Consultant, 90 7th Street, Suite 17-100, San Francisco, CA 94103, Tel: (415) 625-2230, E-Mail:Dispensa.Harry@dol.gov.

**RELATED INSTRUCTION:** An organized and systematic form of instruction designed to provide the apprentice with knowledge of the theoretical and technical subjects related to the apprentice's occupation. Such instruction may be given in a classroom, through occupational or industrial courses, or by correspondence courses of equivalent value, electronic media, or other forms of self-study approved by the Registration Agency.

**SPONSOR:** Any person, association, committee, or organization that operates an apprenticeship program and in whose name the program is registered. The sponsor in whose name the standards of apprenticeship will be registered, and which will have the full responsibility for administration and operation of the apprenticeship program. The sponsor means El Camino Community College District, and it may delegate those responsibilities to other entities as it deems suitable.

**STANDARDS OF APPRENTICESHIP:** This entire document, including all appendices and attachments hereto, and any future modifications and additions approved by the Registration Agency.

**SUPERVISOR OF APPRENTICE(S):** An individual designated by the program sponsor to supervise or have charge and direction of an apprentice.

**TIME-BASED OCCUPATION:** An occupation using an apprenticeship approach that measures skill acquisition through the individual apprentice's completion of at least 2,000 hours of on-the-job learning as described in a work process schedule.

**TRANSFER:** A shift of apprenticeship registration from one program to another or from one employer within a program to another employer within that same program, where there is agreement between the apprentice and the affected apprenticeship committees or program sponsors.

YOUTHBUILD: A youth and community development program that addresses core issues facing low-income communities: housing, education, employment, crime prevention, and leadership development. In YouthBuild programs, low-income young people ages 16-24 work toward their high school diploma or General Educational Development (GED) equivalency, learn job skills and serve their communities by building affordable housing, and transform their own lives and roles in society. Sponsors that wish to hire YouthBuild students who are trained in any occupation covered under these standards and who meet the minimum qualifications for apprenticeship may do so via the direct entry provision described in Appendix D: Selection Procedures.

## **SECTION XXVI - OFFICIAL ADOPTION OF APPRENTICESHIP STANDARDS**

El Camino Community College District hereby adopts these standards of apprenticeship on this 25th day of June, 2020.

Sponsor(s) may designate the appropriate person(s) to sign the standards on their behalf.

/s/ Dena P. Maloney

Dr. Dena P. Maloney  
Superintendent/President  
El Camino Community College District  
Program Sponsor

**APPENDIX A1**

**WORK PROCESS SCHEDULE**  
**AND**  
**RELATED INSTRUCTION OUTLINE**

DEVELOPED BY

EL CAMINO COMMUNITY COLLEGE DISTRICT  
dba EL CAMINO COLLEGE

FOR THE OCCUPATION OF

AEROSPACE ELECTRONICS TECHNICIAN  
(IT LAB TECHNICIAN)  
O\*NET-SOC CODE : 17-3023.01 RAPIDS CODE : 0169CB

This schedule is attached to and a part of these Standards for the above identified occupation.

1. TYPE OF OCCUPATION

Time-based                       Competency-based                       Hybrid

2. TERM OF APPRENTICESHIP

The term of the occupation shall be defined by the attainment of all competencies of the position, which would be reasonably expected to occur within 4,000 hours of OJL, supplemented by the minimum required 144 hours of related instruction each year, based on the specific employer's needs.

3. RATIO OF APPRENTICES TO JOURNEYWORKERS

A numeric ratio of apprentices to journeyworkers consistent with proper supervision, training, safety, and continuity of employment will be defined in the Employer Acceptance Agreement. The ratio language must be specific and clearly described as to its application to the job site. The apprentice to journeyworker ratio is: 1 apprentice(s) to 1 journeyworker, unless otherwise determined.

#### 4. APPRENTICE WAGE SCHEDULE

Apprentice starting wages will be a minimum of \$15.00 per hour. Apprentices shall be paid a progressively increasing schedule of wages based on either a percentage or a dollar amount of the current minimum hourly journeyworker wage rate of \$17.00 per hour, or as specified in the Employer Acceptance Agreement.

Example Wage Schedule: 2-years to competency

1st 12 months = \$15/hr.      2nd 12 months = \$16/hr.

Final = \$17/hr.

#### 5. WORK PROCESS SCHEDULE (See attached Work Process Schedule)

The sponsor may modify the work processes to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

#### 6. RELATED INSTRUCTION OUTLINE (See attached Related Instruction Outline)

The sponsor may modify the related instruction to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

### **WORK PROCESS SCHEDULE**

#### **AEROSPACE ELECTRONICS TECHNICIAN (IT LAB TECHNICIAN)**

#### **O\*NET-SOC CODE: 17-3023.01 RAPIDS CODE: 0169CB**

Description : Performs a range of routine mechanical and/or electromechanical fabrication, modification, and assembly of small parts or components in accordance with company instructions and procedures. Will perform various support tasks for Quality, Test, Troubleshoot, Repair and routine solder assemblies with analog and digital micro-chip, circuitry and/or component assembly for mechanical and/or electromechanical PCBs The term of the occupation shall be defined by the attainment of all competencies of the position, which would be reasonably expected to occur within 2,000 to 4,000 hours of OJL. The following shows approximate hours although these could widely vary based on each apprentice's demonstrated knowledge, skills and ability.

#### WORK PROCESSES

- a. Safety and Health
  - i. Follow all safety procedures and policies
  - ii. Work safely around machinery and others
  - iii. Properly use all Tools, Test Equipment and required Personal Protective Equipment (PPE)

- iv. Adhere Lock Out/Tag Out procedure whenever required
- v. Properly use, store and dispose of all trade-related hazardous materials
- vi. Describe proper hazardous communication (MSDS)
- vii. Emergency Action
- b. Introduction to Aerospace
  - i. Adhere to Aerospace Laws and Regulations relevant to Aerospace work
  - ii. Adhere to Clean Room, Contamination and Foreign Object Debris (FOD) and Foreign Object Elimination (FOE), ESD/Extreme ESD (Electro Static Discharge) principles
  - iii. Demonstrate best practices for clean room and controlled environment cleanliness and documentation protocols
  - iv. Describe and demonstrate appropriate processes and procedures for eliminating and preventing contamination and FOD in the manufacturing environment.
  - v. Describe and demonstrate adherence to industry and company ethics policies
  - vi. Demonstrate ability to adhere to materials, processes and final product quality specifications outlined by industry and the employer
  - vii. Support and maintain quality systems outlined by the employer
  - viii. Describe proper information security protocols based on company policy related to the use and storage of company data
- c. Introduction to Electronics
  - i. Demonstrate ability to construct and test electric circuits
  - ii. Demonstrate ability to identify components
  - iii. Demonstrate knowledge and ability to utilize other electrical components
  - iv. Demonstrate knowledge of electric circuit analysis
  - v. Demonstrate and describe the process for and perform passive and active component measurements
  - vi. Demonstrate and describe the process for measurements for alternating currents
- d. Basic Electronic Fabrication
  - i. Demonstrate ability to read and interpret schematic symbols, describe concepts of schematic/circuit design, identify components, safe use of hand-tools and basic soldering techniques
  - ii. Demonstrate ability to safely conduct the etching process including printed circuit board preparation, pad bonding, resist, etching, neutralization and disposal of spent etchant and plating techniques
  - iii. Demonstrate proper soldering techniques for printed circuit boards (PCBS's) including describing types of solder, types of fluxes and performing component installation and component removal on PCB's and renewing surfaces on PCBs

- iv. Demonstrate ability to interpret schematic and pictorial drawings including describing basic circuit layout techniques, routing of all traces, space allotment concerns, reverse engineering and continuous improvement techniques and basic computerized design tools
  - v. Describe circuit board layout concepts such as direct transfer, Kodak Photo Resist (KPR), silk screening, printed circuit board layout, single, side, double sided and multi-layer printed circuit boards
  - vi. Demonstrate and describe proper test and measurement techniques including loading, power dissipation, methods for reporting data for mass production
- e. Introduction to Direct and Alternating Current Circuits
- i. Related to electric quantities and measurements
  - ii. Perform circuit analysis in a lab setting including resistance measurements for direct current (DC) series circuits, voltage and current measurements for DC series circuits and document analysis through formal lab report
  - iii. Perform parallel circuit analysis including total resistance calculations, compound circuit equivalencies and maximum power transfer calculations
  - iv. Perform compound circuit analysis including parallel services vs. series parallel analysis, compound circuit equivalencies and maximum power transfer calculations
  - v. Describe Superposition Theorem and demonstrate analysis of multi-source circuits by using a circuit overlay method, superposition analysis, and describe aiding and opposing circuits
  - vi. Describe process for and conduct DC circuit calculations related to capacitors in series and parallel, inductors in series and parallel, RC and LR timing circuits charge and discharge, asymptotic relationships exhibited in RC and LR charge and discharge states
  - vii. Describe processes and perform alternating current (AC) circuit analysis including period and frequency, peak-peak, peak, root mean squared and average voltage, current and power, instantaneous voltages and currents
- f. Semiconductor Circuits
- i. Describe principles of amplification, function of power supplies, power (motor) control concepts, audio and radio frequencies
  - ii. Describe diodes and their application including half wave rectifier, full wave rectifier, voltage multipliers, clippers and clampers, Zener regulation and clipping and varactor diodes
  - iii. Describe bipolar transistor components such as transistor switch, Ohmmeter tests, transistor action, voltage gain and configurations,

- Darlington connection, Class A, AB, and B amplifiers and complimentary and quasi-complimentary amplifiers
- iv. Describe and demonstrate use of field-effect transistor (FET) devices such as junction field effect transistors (JFETs), metal oxide effect transistors (MOSFETS), power vertical channel metal-oxide semiconductor (VMOS), Ohmmeter tests, voltage gain and phase inversion and configuration
- v. Describe and demonstrate use of operational amplifiers including inverting mode gain and non-inverting gain

The above work process is intended as a guide. It is not to be followed in any particular sequence, and it is understood that some adjustments may be necessary in the hours allotted for different work experience. In all cases, the apprentice is to receive sufficient experience to make him fully competent and use good workmanship in all work processes which are part of the trade. In addition, the apprentice shall be fully instructed in safety and OSHA requirements.

The above apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law.

## Apprenticeship Competencies – Behavioral

In addition to mastering all the essential technical competencies, an apprentice must consistently demonstrate at an acceptable level the following behavioral competencies in order to complete the apprenticeship.

### Item # Behavioral Competencies

- 1 Participation in team discussions/meetings
- 2 Focus in team discussions/meetings
- 3 Focus during independent work
- 4 Openness to new ideas and change
- 5 Ability to deal with ambiguity by exploring, asking questions, etc.
- 6 Knows when to ask for help
- 7 Able to demonstrate effective group presentation skills
- 8 Able to demonstrate effective one-on-one communication skills
- 9 Maintains an acceptable attendance record
- 10 Reports to work on time
- 11 Completes assigned tasks on time
- 12 Uses appropriate language
- 13 Demonstrates respect for customers, co-workers and supervisors
- 14 Demonstrates trust, honesty and integrity
- 15 Requests and performs work assignments without prompting
- 16 Appropriately cares for personal dress, grooming and hygiene
- 17 Maintains a positive attitude
- 18 Cooperates with and assists co-workers

- 19 Follows instructions/directions
- 20 Able to work under supervision
- 21 Able to accept constructive feedback and criticism
- 22 Able to follow safety rules
- 23 Able to take care of equipment and work place
- 24 Able to keep work area neat and clean
- 25 Able to meet supervisor's work standards
- 26 Able to not let personal life interfere with work
- 27 Adheres to work policies/rules/regulations

**RELATED INSTRUCTION OUTLINE**

**AEROSPACE ELECTRONICS TECHNICIAN (IT LAB TECHNICIAN)**

**O\*NET-SOC CODE: 17-3023.01 RAPIDS CODE: 0169CB**

The related instruction has been developed in cooperation with employer-partners as part of the apprenticeship. Prior credit for any of the below course topics may be given at the employer’s discretion.

Related technical instruction - This instruction shall include, but not be limited to, at least 144 hours per year for each year of the apprenticeship. The related theoretical education is tightly integrated with real work product. The curriculum is defined as a variety of courses and course topics, around which the exams and projects are based. By defining the RTI in this way, all competencies required of the students are met, through project work.

Course Topics	Hours
Safety & Health	10
Introduction to Aerospace	10
Introduction to Electronics	34
Basic Electronic Fabrication	34
Introduction to Direct and Alternating Current Circuits	24
Semiconductor Circuits	24
Other Workplace Skills	8
<b>TOTAL</b>	<b>144</b>

Electronic Production Internal Certifications

Certifications must be achieved to demonstrate proficiency in the following in order to complete the RTI:

- Read and interpret blueprints and schematics
- Execute J standard/NASA soldering
- Use torqueing techniques
- Assemble of wiring and connectors
- Bonding /adhesive and coating application techniques

- Crimping/harness assembly procedures
- Lead forming techniques
- J standard inspection procedures

The above course topics are described and include feature design, technical hints and tips from industry experts, and review questions.

#### Safety & Health (10 hours)

Observe safe practices, in accordance with OSHA, FDA and organizational requirements, when performing tasks within the working environment.

- General Workplace Safety
- Right-to-Know/ Safety Data Sheets (SDS)
- Proper Use of All Personal Protective Equipment (PPE)
- First Aid & CPR
- Lock-Out/Tag-Out (LOTO)
- 6S
- Hazardous Materials Awareness Training

#### Introduction to Aerospace (10 hours)

Apply a working knowledge of foundational industry principles related to regulations and controls, ethics, contamination and foreign object damage (FOD) and quality assurance and control principles within the manufacturing environment.

- Regulations and Controls
- Clean Room/Contamination and Foreign Object Debris (FOD)
- Ethics
- Quality Assurance and Control

#### Introduction to Electronics (34 Hours)

Apply a working knowledge of Electronics concepts and technology within the manufacturing environment.

- Safety in the ECC Laboratory
- Construction and Testing of Electric Circuits
- Component Identification
- Electric Circuit Analysis
- Other Electrical Components
- Electric Circuit Analysis
- Passive and Active Component Measurements
- Measurements for Alternating Currents

#### Basic Electronic Fabrication (34 Hours)

Apply a working knowledge of Basic Electronic Fabrication processes and technology within the manufacturing environment.

- Schematic – Circuit Design
- Soldering Techniques for Printed Circuit Boards (PCBs)
- Schematic and Pictorial Drawings
- Circuit Board layout

- PCB Layout Techniques
- Chassis Layout
- Chassis/Packaging Fabrication
- Documentation Requirements
- Computer Assisted Circuit Design
- Test and Measurement Techniques

#### Introduction to Direct and Alternating Current Circuits (24 Hours)

Apply a working knowledge of a variety of direct and alternating circuit concepts and technology to perform required tasks in the manufacturing environment.

- Series Circuit Analysis
- Parallel Circuit Analysis
- Compound Circuit Analysis
- Superposition Theorem
- Thevenin's Theorem
- Norton's Theorem
- Millman's Theorem
- Resistor Capacitor (RC) and Inductor Resistor (LR)
- Alternating Current (AC) Circuit Analysis
- RC, LR and Resistor, Capacitor and Inductor Impedance (RCL)
- Parallel and Series Parallel RC, LR and RCL

#### Semiconductor Circuits (24 Hours)

Apply a working knowledge of semiconductor circuit concepts, uses and technology in the workplace.

- Diodes and their Application
- Bipolar Transistors
- Field-Effect Transistor (FET) Devices
- Operational Amplifiers

#### Other Workplace Skills (8 hours)

Apply good practices in the exchange of information between two or more people in casual conversation or within a formal discussion through verbal and or written means.

- Interpersonal Communications: oral and written
- Sexual Harassment Prevention Training
- Work Readiness Skills

## APPENDIX A2

### WORK PROCESS SCHEDULE

#### AND

### RELATED INSTRUCTION OUTLINE

DEVELOPED BY  
EL CAMINO COLLEGE  
dba EL CAMINO COLLEGE  
FOR THE OCCUPATION OF

CNC OPERATOR - MILLING AND TURNING  
(AEROSPACE CNC MACHINING TECHNICIAN)  
O\*NET-SOC CODE: 51-4034.00 RAPIDS CODE: 1094CB

This schedule is attached to and a part of these Standards for the above identified occupation.

1. TYPE OF OCCUPATION

Time-based                       Competency-based                       Hybrid

2. TERM OF APPRENTICESHIP

The term of the occupation shall be defined by the attainment of all competencies of the position, which would be reasonably expected to occur within 2,000 to 4,000 hours of OJL, supplemented by the minimum required 144 hours of related instruction each year, based on the specific employer's needs.

3. RATIO OF APPRENTICES TO JOURNEYWORKERS

A numeric ratio of apprentices to journeyworkers consistent with proper supervision, training, safety, and continuity of employment will be defined in the Employer Acceptance Agreement. The ratio language must be specific and clearly described as to its application to the job site. The apprentice to journeyworker ratio is: 1 apprentice(s) to 1 journeyworker, unless otherwise determined.

4. APPRENTICE WAGE SCHEDULE

Apprentice starting wages will be a minimum of \$15.00 per hour. Apprentices shall be paid a progressively increasing schedule of wages based on either a percentage or a dollar amount of the current minimum hourly journeyworker wage rate of \$17.00 per hour, or as specified in the Employer Acceptance Agreement.

Example Wage Schedule: 2-years to competency

1st 12 months = \$15/hr      2nd 12 months = \$16/hr      Final = \$17/hr

5. WORK PROCESS SCHEDULE (See attached Work Process Schedule)

The sponsor may modify the work processes to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

6. RELATED INSTRUCTION OUTLINE (See attached Related Instruction Outline)

The sponsor may modify the related instruction to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

WORK PROCESS SCHEDULE

CNC OPERATOR - MILLING AND TURNING

(AEROSPACE CNC MACHINING TECHNICIAN)

O\*NET-SOC CODE: 51-4034.00 RAPIDS CODE: 1094CB

Description: Produces machined parts by programming, setting up, and operating a computer numerical control (CNC) machine; maintaining quality and safety standards; keeping records; maintaining equipment and supplies. The term of the occupation shall be defined by the attainment of all competencies of the position, which would be reasonably expected to occur within 2,000 to 4,000 hours of OJL. The following shows approximate hours although these could widely vary based on each apprentice's demonstrated knowledge, skills and ability.

WORK PROCESS SCHEDULE

- A. Safety, Health, and the Aerospace Industry
  - a. Follow all safety procedures and policies
  - b. Work safely around machinery and others
  - c. Properly use all Tools, Test Equipment and required Personal Protective Equipment (PPE)
  - d. Adhere Lock Out/Tag Out procedure whenever required
  - e. Properly use, store and dispose of all trade-related hazardous materials
- B. Introduction to Aerospace
  - a. Adhere to Aerospace Laws and Regulations relevant to Aerospace work
- C. Federal Aviation Administration (FAA)
- D. Federal Acquisition Regulations (FARs)
- E. National Transportation Safety Board (NTSB)
- F. National Aeronautics and Space Administration (NASA)
- G. European Aviation Safety Agency (EASA)\International Air Transport Association (IATA)
- H. International Traffic in Arms Regulations (ITAR)

- I. Import/Export Requirements
- J. Other laws and regulations
  - a. Adhere to Clean Room, Contamination and Foreign Object Damage (FOD) principles
  - b. Demonstrate best practices for clean room and controlled environment cleanliness and documentation protocols
  - c. Describe and demonstrate appropriate processes and procedures for eliminating and preventing contamination and FOD in the manufacturing environment.
  - d. Describe and demonstrate adherence to industry and company ethics policies
  - e. Demonstrate ability to adhere to materials, processes and final product quality specifications outlined by industry and the employer
- K. Support and maintain quality systems outlined by the employer
- L. Introduction to CNC Machining
  - a. Demonstrate knowledge of machine tool technology, safe shop practices in metalworking, hand tools and bench work
  - b. Perform machine tool calculations including speeds and feeds and using lathe toolbit geometry
  - c. Competently utilize measuring tools such as rulers, scales, micrometers, verniers calipers and other hand measurement tools
  - d. Demonstrate use of layout hand tools, layout tables, marking fluids and other tools as applicable
  - e. Describe difference between a variety of materials used in manufacturing such as ferrous and non-ferrous metals, carbon steels, cast irons and alloys
  - f. Demonstrate safe usage of a variety of saws used in the manufacturing environment such as power and band saws and proper band saw blade selection and operation
  - g. Demonstrate ability to read engineering drawings including views, orthographic and isometric projection, alphabet of lines, detail drawing versus assembly drawing and drawing page layout
  - h. Identify and describe engine lathe parts and accessories, cutting speeds, feeds and depth of cut and safe lathe operations
  - i. Describe thread terminology, forms, fits and classifications as well as thread calculations and cutting and measurement instructions
  - j. Demonstrate and describe drilling operations including use of drill presses and machine accessories, twist drills, cutting speeds and feeds, drilling holes and safe drill press operation
  - k. Demonstrate and describe milling machines, accessories, cutters, cutting speeds, feeds and depth of cut and safe milling machine set up and operation
  - l. Demonstrate and describe types of CNC milling machines, Cartesian coordinate system, point-to-point positioning, continuous path control, absolute programming and safe CNC set up and operation

- m. Demonstrate and describe processes for types of grinding machines and accessories and safe surface-grinding operations

M. CNC Turning

- a. Demonstrate knowledge of machine tool technology, safe shop practices in metalworking, hand tools and bench work
- b. Perform basic machining and supplemental processes including measurement, basic lathe, milling machines, grinding, print reading and procedures.
- c. Demonstrate safe external lathe operations including facing, parallel turning, shoulder turning, knurling, grooving, cutting off, filing, polishing, grinding and taper turning and other forms of threading and turning as applicable.
- d. Demonstrate safe internal lathe operations such as center drilling, drilling, reaming, boring, internal threading, internal taper turning, tapping and honing as applicable.
- e. Demonstrate safe operation of work-holding devices and tooling such as three-jaw and four-jaw universal chuck, collet chuck, quick release collet, magnetic chuck, faceplates and lathe dogs, jigs, fixtures and angle plates, steadyrest, follower rest and mandrel, cutting tool holding devices and quick-change tooling.
- f. Describe and demonstrate safe threading operations such as thread terminology, thread forms, thread fits, classifications and calculations and demonstrate safe thread-cutting operations and measurement.
- g. Demonstrate ability to perform CNC programming tasks such as entering comments, formats, input, proofing and editing including word address programming, Intuitive Programming System (IPS), Cartesian coordinates, machine tool axes, lathe format and words, MDI, computer downloads, methods of program proofing and editing.
- h. Demonstrate knowledge of applied trigonometry including formulas and calculations used for angle cutting, taper turning, thread calculations, toolbit grinding and angle measurement.
- i. Perform functions related to tapers, taper calculations and inspection such as use of standard tapers, self-holding and self-releasing tapers, taper calculations, taper attachment, tailstock offset, form turning, compound rest and taper inspection techniques.
- j. Demonstrate operation of Machine Control Units (MCU), MDI such as control panel and manual operation, offset menus, program library, displays, feed hold and emergency stop procedures.
- k. Demonstrate usage of tool offsets and tool holding devices including tool change and offset codes, tool offset measurement, tool offset storage, tool storage, carbide and quick change tool holders.
- l. Demonstrate and describe safe set up and operation of the CNC Lathe including CNC performance, advantages and disadvantages of CNC, power up, setting zero part, setting tool length offset, downloading program and automatic operation.

N. CNC Milling

- a. Demonstrate knowledge of machine tool technology, safe shop practices in metalworking, hand tools and bench work
- b. Perform basic machining and supplemental processes including measurement, basic lathe, milling machines, grinding, print reading and procedures.
- c. Demonstrate safe and efficient set up and operation of conventional milling machine such as horizontal milling machine operations and milling cutters.
- d. Demonstrate knowledge of applied trigonometry including formulas and calculations such as rotary table, index and dividing head, dovetail and compound angle cutting calculations.
- e. Demonstrate and describe safe set up and operation of the CNC Milling Machine including CNC performance, advantages and disadvantages of CNC, Cartesian coordinates, machine tool axes, absolute system, storage and input media, programming format, program planning, machine start-up, fixture and tool offset, automatic operations and shut down and emergency stop operations.
- f. Demonstrate ability to program commands and codes including describing methods of program proofing, online and offline editing, screen plotting and dry run, programming format, program name code, axis code, G-codes, M-codes, S-word, F-word.
- g. Demonstrate ability to safely select and operate the proper tool and workpiece holding equipment including cutting tools, collet holders, CAT 40 holders, vises, fixtures, tooling plates and clamping systems.
- h. Demonstrate ability to set tooling such as set tool lengths, use tool setters, offset page, H-word, setting pre-set tools and offsetting pre-set tools.
- i. Demonstrate abilities to operate machine control units and perform manual data input on equipment such as: Haas, Fadal, Fanuc, and perform keyboard entries and save manual data input programs.
- j. Demonstrate ability to securely transfer and store data using commercially available methods such as USB thumb drive, electronic download and compact flash card.

O. Advanced Manufacturing Processes

- a. Demonstrate proper operating process and procedure for measurement, lathe, milling machining, grinding, print reading and manufacturing procedures.
- b. Demonstrate proper operating process and procedures for surface grinding, cylindrical grinding and tool and cutter grinding
- c. Demonstrate and describe safe usage of coated and bonded abrasives
- d. Demonstrate ability to perform advanced precision measurement functions such as coordinate measuring machine, use of optical comparator, hardness testing, cylindrical square, Vernier protractor, and fixed gages

- e. Demonstrate use of applied trigonometry related to sine bars and plates, gage blocks and engineering drawing applications
- f. Describe concepts of Geometric Dimensioning and Tolerancing (GD&T) including general rules, datums and modifiers.
- g. Demonstrate proper uses of electrical discharge machines (EDM) including cutting process and procedures, dielectric fluids, overcut and tolerances, sinker and wire
- h. Demonstrate safe usage of abrasive water jet machines including proper cutting processes and procedures, stream and kerf width, describe abrasive types, demonstrate piercing and cutting techniques.

The above work process is intended as a guide. It is not to be followed in any particular sequence, and it is understood that some adjustments may be necessary in the hours allotted for different work experience. In all cases, the apprentice is to receive sufficient experience to make him fully competent and use good workmanship in all work processes which are part of the trade. In addition, the apprentice shall be fully instructed in safety and OSHA requirements.

The above apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law.

#### Apprenticeship Competencies – Behavioral

In addition to mastering all of the essential technical competencies, an apprentice must consistently demonstrate at an acceptable level the following behavioral competencies in order to complete the apprenticeship.

#### Item # Behavioral Competencies

- 1 Participation in team discussions/meetings
- 2 Focus in team discussions/meetings
- 3 Focus during independent work
- 4 Openness to new ideas and change
- 5 Ability to deal with ambiguity by exploring, asking questions, etc.
- 6 Knows when to ask for help
- 7 Able to demonstrate effective group presentation skills
- 8 Able to demonstrate effective one-on-one communication skills
- 9 Maintains an acceptable attendance record
- 10 Reports to work on time
- 11 Completes assigned tasks on time
- 12 Uses appropriate language
- 13 Demonstrates respect for patients, co-workers and supervisors
- 14 Demonstrates trust, honesty and integrity
- 15 Requests and performs work assignments without prompting

- 16 Appropriately cares for personal dress, grooming and hygiene
- 17 Maintains a positive attitude
- 18 Cooperates with and assists co-workers
- 19 Follows instructions/directions
- 20 Able to work under supervision
- 21 Able to accept constructive feedback and criticism
- 22 Able to follow safety rules
- 23 Able to take care of equipment and work place
- 24 Able to keep work area neat and clean
- 25 Able to meet supervisor's work standards
- 26 Able to not let personal life interfere with work
- 27 Adheres to work policies/rules/regulations

## RELATED INSTRUCTION OUTLINE

### CNC OPERATOR - MILLING AND TURNING

#### (AEROSPACE CNC MACHINING TECHNICIAN)

O\*NET-SOC CODE: 51-4034.00 RAPIDS CODE: 1094CB

The related instruction has been developed in cooperation with employer-partners as part of the apprenticeship. Prior credit for any of the below course topics may be given at the employer's discretion.

Related technical instruction - This instruction shall include, but not be limited to, at least 144 hours per year for each year of the apprenticeship. The related theoretical education is tightly integrated with real work product. The curriculum is defined as a variety of courses and course topics, around which the exams and projects are based. By defining the RTI in this way, all competencies required of the students are met, through project work.

Course Topics	Hours
Safety & Health	20
Introduction to Aerospace	10
Introduction to CNC Machining	30
CNC Turning	35
CNC Milling	35
Advanced Manufacturing Processes	24
Other Workplace Skills	10
TOTAL	144

The above course topics are described and include feature design, technical hints and tips from industry experts, and review questions.

#### Safety & Health (20 hours)

Observe safe practices, in accordance with OSHA, FDA and organizational requirements, when performing tasks within the working environment.

- General Workplace Safety
- Right-to-Know/ Safety Data Sheets (SDS)
- Proper Use of All Personal Protective Equipment (PPE)
- First Aid & CPR
- Lock-Out/Tag-Out (LOTO)
- 6S
- Hazardous Materials Awareness Training

#### Introduction to Aerospace (10 hours)

Apply a working knowledge of foundational industry principles related to regulations and controls, ethics, contamination and foreign object damage (FOD) and quality assurance and control principles within the manufacturing environment.

- Regulations and Controls
- Clean Room/Contamination and Foreign Object Damage (FOD)
- Ethics
- Quality Assurance and Control

#### Introduction to CNC Machining (30 hours)

Apply a working knowledge of foundational skills and tools used when performing tasks related to CNC Machining within the manufacturing environment.

- Machine Tool Technology
- Machine Tool Calculations
- Measurement and Measuring Tools
- Layout Tools
- Materials of Manufacture
- Power Saws
- Reading Engineering Drawings
- Engine Lathes
- Threads
- Drilling Operations
- Conventional Milling Machines
- CNC Milling Machines, Introduction and Demonstration
- Grinding Machines

#### CNC Turning (35 Hours)

Apply a working knowledge of CNC Turning processes and technology within the manufacturing environment.

- Orientation and Safety Review
- Basic Machining and Supplemental Processes
- External Lathe Operations

- Internal Lathe Operations
- Work-holding Devices and Tooling
- Threading Operations
- CNC Programming, Commands, Formats, Input, Proofing, Editing
- Applied Trigonometry
- Tapers, Taper Calculations and Inspection
- Machine Control Units (MCU), MDI
- Tool Offsets and Tool Holding Devices
- Set up and CNC Lathe Operation

#### CNC Milling (35 Hours)

Apply a working knowledge of CNC Milling processes and technology within the manufacturing environment.

- CNC Milling Safety
- Review – Basic Machining and Supplemental Processes
- Conventional Milling Machine Orientation, Setup and Operation
- Applied Trigonometry
- CNC Milling Machine Orientation, Set up and Operation
- Programming Commands and Codes
- Tool selection and Workpiece Holding
- Tool Length Offsets and Pre-set Tooling
- Machine Control Unites and Manual Data Input (MDI)
- Data Transfer and Storage

#### Advanced Manufacturing Processes (24 Hours)

Apply a working knowledge of a variety of advanced manufacturing tools, equipment, processes and skills to perform required tasks in the manufacturing environment.

- Review of Machining and Supplemental Processes
- Grinding Operations
- Abrasives
- Advanced Precision Measurement
- Applied Trigonometry
- Geometric Dimensioning and Tolerancing (GD&T)
- Electrical Discharge Machines (EDM)
- Abrasive Water Jet Machines

#### Other Workplace Skills (10 hours)

Apply good practices in the exchange of information between two or more people in casual conversation or within a formal discussion through verbal and or written means.

**APPENDIX A3**

**WORK PROCESS SCHEDULE**

**AND**

**RELATED INSTRUCTION OUTLINE**

DEVELOPED BY

EL CAMINO COMMUNITY COLLEGE DISTRICT  
dba EL CAMINO COLLEGE

FOR THE OCCUPATION OF

AEROSPACE ELECTROMECHANICAL TECHNICIAN  
(USDOL EXISTING TITLE: ELECTROMECHANICAL TECHNICIAN)  
O\*NET-SOC CODE: 17-3024.00 RAPIDS CODE: 0167CB

This schedule is attached to and a part of these Standards for the above identified occupation.

Time-based       Competency-based       Hybrid

The term of the occupation shall be defined by the attainment of all competencies of the position, which would be reasonably expected to occur within one to two years of OJL, supplemented by the minimum required 144 hours of related instruction each year, based on the specific employer's needs.

A numeric ratio of apprentices to journeyworkers consistent with proper supervision, training, safety, and continuity of employment will be defined in the Employer Acceptance Agreement. The ratio language must be specific and clearly described as to its application to the job site. The apprentice to journeyworker ratio is: 1 apprentice(s) to 1 journeyworker, unless otherwise determined.

Apprentice starting wages will be a minimum of \$15.00 per hour. Apprentices shall be paid a progressively increasing schedule of wages based on either a percentage or a dollar amount of the current minimum hourly journeyworker wage rate between \$17.00 per hour, or as specified in the Employer Acceptance Agreement. Two Year Wage Scale:

1st 12 months \$15.00 / hour      2nd 12 months \$16.00 / hour  
Final minimum journeyworker wage is \$17.00 / hour.

The sponsor may modify the work processes to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

The sponsor may modify the related instruction to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

## WORK PROCESS SCHEDULE

### AEROSPACE ELECTROMECHANICAL TECHNICIAN

(USDOL EXISTING TITLE: ELECTROMECHANICAL TECHNICIAN)

O\*NET-SOC CODE: 17-3024.00 RAPIDS CODE: 0167CB

Description: Performs a range of routine mechanical and/or electromechanical fabrication, modification, and assembly of small parts or components in accordance with company instructions and procedures. Will perform various support tasks for Quality, Test, and Troubleshooting. The term of the occupation shall be defined by the attainment of all competencies of the position, which would be reasonably expected to occur within one to two years of OJL.

## WORK PROCESSES

- 1 Safety and Health
  - a. Follow all safety procedures and policies.
  - b. Work safely around machinery and others.
  - c. Properly use all Tools, Test Equipment, and required Personal Protective Equipment (PPE).
  - d. Adhere Lock Out/Tag Out procedure whenever required.
  - e. Properly use, store and dispose of all trade related hazardous materials.
  - f. Describe proper hazardous communication - Material Safety Data Sheets (MSDS).
  - g. Emergency Action
  
- 2 Introduction to Aerospace
  - a. Adhere to regulations relevant to aerospace work.
  - b. Adhere to Clean Room, Contamination and Foreign Object Debris (FOD) and
  
- 3 Foreign Object Elimination (FOE), ESD/Extreme ESD (Electro Static Discharge) principles.
  - a. Demonstrate best practices for clean room and controlled environment cleanliness and documentation protocols.
  - b. Describe and demonstrate appropriate processes and procedures for eliminating and preventing contamination and FOD in the manufacturing environment.

- c. Demonstrate adherence to industry and company ethics policies.
  - d. Demonstrate ability to adhere to materials, processes and final product quality specifications outlined by industry and the employer.
  - e. Support and maintain quality systems outlined by the employer.
  - f. Describe proper information security protocols based on company policy related to the use and storage of company data.
- 4 Introduction to Electronics
- a. Demonstrate ability to read and interpret a wire diagram.
  - b. Demonstrate ability to identify components.
  - c. Demonstrate knowledge and ability to utilize other electrical components.
  - d. Demonstrate and describe the process for, and perform passive and active component measurements.
  - e. Demonstrate and describe the process for measurements of alternating currents.
- 5 Basic Electronic Fabrication
- a. Demonstrate ability to read and interpret schematic symbols, describe concepts of schematic/circuit design, identify components, safe use of hand tools and basic soldering techniques.
  - b. Demonstrate ability to interpret electromechanical schematic and pictorial drawings.
  - c. Demonstrate ability to safely prepare and bond/pot connectors.
  - d. Demonstrate ability to perform pre and post pot testing as well as final electrical tests.
  - e. Demonstrate proper soldering techniques in regards to RF cables and DC Harness connectors, including describing types of solder, types of fluxes, and performing component installation and component.
  - f. Describe the layout for the cut, bond and wrap of cable assemblies.
- 6 Introduction to Direct and Alternating Currents
- a. Perform analysis in a lab setting including resistance measurements for direct current (DC) series circuits, voltage and current measurements; document analysis through formal lab reports.
  - b. Perform routine operational tests and fault isolation on development systems and equipment, to ensure conformance with design specifications.
  - c. Diagnose and isolate malfunctions down to the component level.
- 7 In-line installation into a connector
- a. Describe diodes/resistors and their application including in-line installation into a D-Sub and Circular connector.
  - b. Utilize routine diagnostic equipment – for example, oscilloscopes, VOM, DDM, signal generators, and digital analyzers.
  - c. Describe and demonstrate use of field-effect transistor (FET) devices such as junction field effect transistors (JFETs), metal oxide effect transistors (MOSFETS), power vertical channel metal oxide

semiconductor (VMOS), Ohmmeter tests, voltage gain and phase inversion and configuration.

- d. Describe and demonstrate use of operational amplifiers including inverting mode gain and non-inverting gain.

## 8 Mechanical Skills

- a. Fabricate and assemble new or modified mechanical components or assemblies using the following methods: Drilling, bonding, torqueing, etc.
- b. Read and interpret designs in order to set up the tooling.
- c. Design and fabricate shop aids.

The above work process is intended as a guide. It is not to be followed in any particular sequence, and it is understood that some adjustments may be necessary in the hours allotted for different work experience. In all cases, the apprentice is to receive sufficient experience to ensure competency and use of good workmanship in all work processes, which are part of the trade. In addition, the apprentice shall be fully instructed in safety and OSHA requirements.

## Apprenticeship Competencies – Behavioral

In addition to mastering all the essential technical competencies, an apprentice must consistently demonstrate, at an acceptable level, the following behavioral competencies in order to complete the apprenticeship. When an individual consistently meets expectations through observation, the supervisor will initial and date the accomplishment of the behavioral competency.

Item #	Behavioral Competencies	Signoff	Date
1	Participation in team discussions/meetings		
2	Focus in team discussions/meetings		
3	Focus during independent work		
4	Openness to new ideas and change		
5	Ability to deal with ambiguity by exploring, asking questions, etc.		
6	Knows when to ask for help		
7	Able to demonstrate effective group presentation skills		
8	Able to demonstrate effective one-on-one communication skills		
9	Maintains an acceptable attendance record		
10	Reports to work on time		
11	Completes assigned tasks on time		
12	Uses appropriate language		
13	Demonstrates respect for customers, co-workers and supervisors		
14	Demonstrates trust, honesty and integrity		
15	Requests and performs work assignments without prompting		
16	Appropriately cares for personal dress, grooming and hygiene		
17	Maintains a positive attitude		
18	Cooperates with and assists co-workers		
19	Follows instructions/directions		
20	Able to work under supervision		

- 21 Able to accept constructive feedback and criticism
- 22 Able to follow safety rules
- 23 Able to take care of equipment and work place
- 24 Able to keep work area neat and clean
- 25 Able to meet supervisor's work standards
- 26 Able to not let personal life interfere with work
- 27 Adheres to work policies/rules/regulations

## RELATED INSTRUCTION OUTLINE

### AEROSPACE ELECTROMECHANICAL TECHNICIAN

(USDOL EXISTING TITLE: ELECTROMECHANICAL TECHNICIAN)

O\*NET-SOC CODE: 17-3024.00 RAPIDS CODE: 0167CB

The related instruction has been developed in cooperation with employer-partners as part of the apprenticeship. Prior credit for any of the below course topics may be given at the employer's discretion.

Related technical instruction - This instruction shall include, but not be limited to, at least 144 hours per year for each year of the apprenticeship. The related theoretical education is tightly integrated with real work product. The curriculum is defined as a variety of courses and course topics, around which the exams and projects are based. By defining the RTI in this way, all competencies required of the students are met through project work.

Course Topics	Hours
Safety & Health	8
Intro to Electromechanical Technicians	8
Intro Shop Floor Control	8
Fundamental Mechanical Tech Tasks	8
Fundamental Electrical Tech Tasks	8
Inspection and Measurement	8
Large Structures Training	8
Electrical I&T Training	8
Mechanical I&T Training	8
Mechanical & Sensor, RF Harness, DC Harness	8
Multi-Layer Insulation (MLI) Training	8
Precision Assembly Training	8
Environmental Testing	8
Manufacturing Engineering Principles	32
Leadership Training	16
Total Hours	152

The above course topics include feature design, technical hints and tips from industry experts, and review questions.

#### Safety & Health (8 hours)

Observe safe practices, in accordance with OSHA, FDA and organizational requirements, when performing tasks within the working environment.

- General Workplace Safety
- Right-to-Know/ Safety Data Sheets (SDS)
- Proper Use of All Personal Protective Equipment (PPE)
- First Aid & CPR
- Lock-Out/Tag-Out (LOTO)
- 6S
- Hazardous Materials Awareness Training

#### Introduction for Electromechanical Technician (8 hours)

Safety, QA processes, fab lab training, Functional Management Structure, goal setting, time charging, overview of areas and product lines, different career paths, handling hardware safely.

#### Introduction to Shop Floor Control (8 hours)

Tools such as Solumina and Enovia, How to write emails, How to read an Engineering Drawing, FIPPS & PRs, TRS and CAPE.

#### Fundamental Mechanical Technician Tasks (8 hours)

Bonding, Surface Prep, Soldering, Torque (Torque vs Preload), microscope basics.

#### Fundamental Electrical Technician Tasks (8 hours)

Familiarize with O-Scopes, DMMS, and Analyzers, etc., Cable Handling and care.

#### Inspection and Measurement (8 hours)

How to use inspection and measurement tools, how the discrepancy report and quality assurance processes work.

#### Large Structures Training (8 hours)

Mirror Bonding, drilling, installing inserts, trimming, etc.

#### Electrical I&T Training (8 hours)

Mate /demate cart, pre-tasks, How to monitor telemetry, how to work ATS.

#### Mechanical I&T Training (8 hours)

Cranes, lifts, click bonds, spotter training, proof loading.

#### Mechanical & Sensor, RF Harness, DC Harness (8 hours)

Mirror bonding, RF connectors, DC Harness.

#### Multi-Layer Insulation (MLI) Training (8 hours)

Multi-Layer insulation fabrication and install training.

Precision Assembly Training (8 hours)

Precision install of small fasteners ~.7mm, Precision solder, Work set-ups, microscope use.

Environmental Testing (8 hours)

Environmental test training in dynamics, acoustics, and thermal cycle testing.

Manufacturing Engineering Principles (32 hours)

Producibility, industrial engineering fundamentals, tool design, human factors engineering, material science, earned value management system basics, electrical engineering fundamentals.

Leadership Training (16 hours)

Technician leadership training on how to lead teams,