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rec'd 3.7.2022 eml L&I Apprenticeship Consultant	Teri Gardner 6-6-22 L&I Admin

Department of Labor and Industries
Apprenticeship Section
PO Box 44530
Olympia WA 98504-4530

Request for Approval of Proposed Standards

TO: Washington State Apprenticeship & Training Council

FROM: Schweitzer Engineering Laboratories 01 Electrician

Check the appropriate box:

☒ Committee ☐ Plant ☐ OJT

Occupation(s)	SOC Code	Hours
General Electrician (01)	47-2111.00	8000

Form must be signed by Committee Chair *and* Secretary *or* Program's Authorized Signer

☒ Chair ☐ Authorized Signer	Date 3.7.2022	☒ Secretary	Date 3.7.2022
Print Name: Patrick Niehenke		Print Name: Nathan Tumelson	
Signature: Patrick Niehenke		Signature: Nathan Tumelson	

Approved By: **Washington State Apprenticeship & Training Council**
Signature of the WSATC:
Date:

Rec'd 6.13.2022 eml

Rcvd 06/14/2022 ES

APPRENTICESHIP PROGRAM STANDARDS
adopted by

SCHWEITZER ENGINEERING LABORATORIES 01 ELECTRICIAN
(sponsor name)

Occupational Objective(s):	SOC#	Term [WAC 296-05-015]
GENERAL ELECTRICIAN (01)	**47-2111.00**	**8000 HOURS**

APPROVED BY
Washington State Apprenticeship and Training Council
REGISTERED WITH
Apprenticeship Section of Fraud Prevention and Labor Standards
Washington State Department Labor and Industries
Post Office Box 44530
Olympia, Washington 98504-4530

APPROVAL:

Provisional Registration

Standards Last Amended

Permanent Registration

By: _____ Chair of Council

By: _____ Secretary of Council

INTRODUCTION

This document is an apprenticeship program standard. Apprenticeship program standards govern how an apprenticeship works and have specific requirements. This document will explain the requirements.

The director of the Department of Labor and Industries (L&I) appoints the Washington State Apprenticeship and Training Council (WSATC) to regulate apprenticeship program standards. The director appoints and deputizes an assistant director to be known as the supervisor of apprenticeship who oversees administrative functions through the apprenticeship section at the department.

The WSATC is the sole regulatory body for apprenticeship standards in Washington. It approves, administers, and enforces apprenticeship standards, and recognizes apprentices when either registered with L&I's apprenticeship section, or under the terms and conditions of a reciprocal agreement. WSATC also must approve any changes to apprenticeship program standards.

Apprenticeship programs have sponsors. A sponsor operates an apprenticeship program and declares their purpose and policy herein to establish an organized system of registered apprenticeship education and training. The sponsor recognizes WSATC authority to regulate and will submit a revision request to the WSATC when making changes to an apprenticeship program standard.

Apprenticeships are governed by federal law (29 U.S.C 50), federal regulations (29 CFR Part 29 & 30), state law (49.04 RCW) and administrative rules (WAC 296-05). These standards conform to all of the above and are read together with federal and state laws and rules

Standards are changed with WSATC approval. Changes are binding on apprentices, sponsors, training agents, and anyone else working under an agreement governed by the standards. Sponsors may have to maintain additional information as supplemental to these standards. When a standard is changed, sponsors are required to notify apprentices and training agents. If changes in federal or state law make any part of these standards illegal, the remaining parts are still valid and remain in force. Only the part made illegal by changes in law is invalid. L&I and the WSATC may cooperate to make corrections to the standards if necessary to administer the standards.

Sections of these standards identified as bold "**insert text**" fields are specific to the individual program standards and may be modified by a sponsor submitting a revised standard for approval by the WSATC. All other sections of these standards are boilerplate and may only be modified by the WSATC. See WAC 296-05-003 for the definitions necessary for use with these standards.

*All sponsor inserted language must meet or exceed minimum requirements as established by the appropriate occupations outlined in these standards for each occupation. Minimum Guideline requirements have been ***emboldened***, ***italicized*** and captured in bordering and may not be revised.

Sponsor Introductory Statement (Required):

Recognizing the continuous technological advancements in the General Electrician 01 industry and the State of Washington Electrical Licensing requirements, this program establishes the necessary training that leads the successful apprentice to the status of the State Certified Journey Level worker in the specified occupation.

To this end, the graduated apprentice will be able to demonstrate all competencies of this trade that exemplify the highest standards of the General Electrician 01 industry. Objectives of this program will be accomplished through the joint efforts of Schweitzer Engineering Laboratories, (SEL) and the Department of Labor and Industries.

I. GEOGRAPHIC AREA COVERED:

The sponsor must train inside the area covered by these standards. If the sponsor wants to train outside the area covered by these standards, the sponsor must enter a portability agreement with a sponsor outside the area, and provide evidence of such an agreement for compliance purposes. Portability agreements permit training agents to use apprentices outside the area covered by the standards. Portability agreements are governed by WAC 296-05-009.

The area covered by these standards shall be Schweitzer Engineering Laboratories facilities, Whitman and Spokane counties in the State of Washington, and Nez Perce, Latah and Ada counties in the State of Idaho.

Applicants and apprentices please note that while the State of Washington has no responsibility or authority in the State of Idaho, the Committee will apply the same standards and guidelines to apprentices registered in the program while working in the Idaho counties of Nez Perce, Latah and Ada.

II. MINIMUM QUALIFICATIONS:

Minimum qualifications must be clearly stated and applied in a nondiscriminatory manner [WAC 296-05-015(17)].

Age:	***18 Years Old***

Education:	***General Electrician (01)*** ***Must be a high school graduate from a school accredited by a State Education Agency; or have a GED; or have completed a High School Equivalency; or have completed an Associate degree or higher from a school accredited by a State Education Agency; and***

Show evidence of successful completion of: 1 full year of high school Algebra with a passing grade of "C" or better.

Applicants who have not completed one full year of high school algebra with a passing grade of "C" or better, may qualify under one of the following:

1. ***Equivalent post high school algebra course(s) with a grade of "C" or better.***
2. ***Current math placement results from a community college facility indicating a placement level beyond high school level algebra.***
3. ***Provide certificate of completion from a committee approved online tech math course.***

Physical: ***Physically and mentally able to safely perform or learn to safely perform essential functions of the job with or without reasonable accommodations.***

Testing: **None**

Other: **None**

III. CONDUCT OF PROGRAM UNDER WASHINGTON EQUAL EMPLOYMENT OPPORTUNITY PLAN:

Sponsors with five (5) or more apprentices must adopt an Equal Employment Opportunity (EEO) Plan and Selection Procedure (chapter 296-05 WAC and 29 CFR Part 30).

The recruitment, selection, employment and training of apprentices during their apprenticeship shall be without discrimination because of race, sex (including pregnancy and gender identity), sexual orientation, color, religion, national origin, age, genetic information, disability or as otherwise specified by law. The sponsor shall take positive action to provide equal opportunity in apprenticeship and will operate the apprenticeship program as required by the rules of the Washington State Apprenticeship and Training Council and Title 29, Part 30 of the Code of Federal Regulations.

A. Selection Procedures:

Exempt per WAC 296-050405(1)(a), fewer than five (5) apprentices.

B. Equal Employment Opportunity Plan:

Exempt per WAC 296-05-405(1)(a), fewer than five (5) apprentices.

C. Discrimination Complaints:

Any apprentice or applicant for apprenticeship who believes they have been discriminated against may file a complaint with the supervisor of apprenticeship (WAC 296-05-443).

IV. TERM OF APPRENTICESHIP:

The term of apprenticeship for an individual apprentice may be measured through the completion of the industry standard for on-the-job learning (at least two thousand hours) (time-based approach), the attainment of competency (competency-based approach), or a blend of the time-based and competency-based approaches (hybrid approach) [WAC 296-05-015].

A. General Electrician (01)
8000 Hours of reasonably continuous employment

V. INITIAL PROBATIONARY PERIOD:

An initial probationary period applies to all apprentices, unless the apprentice has transferred from another program. During an initial probationary period, an apprentice can be discharged without appeal rights. An initial probationary period is stated in hours or competency steps of employment. The initial probationary period is not reduced by advanced credit or standing. During an initial probationary period, apprentices receive full credit for hours and competency steps toward completion of their apprenticeship. Transferred apprentices are not subject to additional initial probationary periods [WAC 296-05-003].

The initial probationary period is [WAC 296-05-015(22)]:

A. The period following the apprentice's registration into the program. An initial probationary period must not be longer than twenty percent of the term of the entire apprenticeship, or longer than a year from the date the apprenticeship is registered. The WSATC can grant exemptions for longer initial probationary periods if required by law.

B. The period in which the WSATC or the supervisor of apprenticeship may terminate an apprenticeship agreement at the written request by any affected party. The sponsor or the apprentice may terminate the agreement without a hearing or stated cause. An appeal process is not available to apprentices in their initial probationary period.

C.

1. ***General Electrician (01)***
   The first one thousand-six hundred (1,600) hours of employment shall constitute the initial probationary period or one year from date of registration, whichever occurs first.

During the initial probationary period, the Committee shall make a thorough review of the apprentice's ability and development. Advanced standing for previous validated work experience or education, as found on file with the Electrical Licensing Section of Labor and Industries does not reduce the probationary period. Transferred apprentices are not subject to additional initial probationary periods.

Prior to the end of the initial probationary period, Committee action must be taken on each probationary apprentice to end the probation or cancel the apprenticeship agreement. The department and employer shall be timely notified of such action.

VI. RATIO OF APPRENTICES TO JOURNEY LEVEL WORKERS

Supervision is the necessary education, assistance, and control provided by a journey-level employee on the same job site at least seventy-five percent of each working day, unless otherwise approved by the WSATC. Sponsors ensure apprentices are supervised by competent, qualified journey-level employees. Journey level-employees are responsible for the work apprentices perform, in order to promote the safety, health, and education of the apprentice.

A. The journey-level employee must be of the same apprenticeable occupation as the apprentice they are supervising unless as noted above or otherwise allowed by the revised Code of Washington (RCW) or the Washington Administrative Code (WAC) and approved by the WSATC.

B. The numeric ratio of apprentices to journey-level employees may not exceed one apprentice per journey-level worker [WAC 296-05-015(5)].

C. Apprentices will work the same hours as journey-level workers, except when such hours may interfere with related/supplemental instruction.

D. Any variance to the rules and/or policies stated in this section must be approved by the WSATC.

E. The ratio must be described in a specific and clear manner, as to the application in terms of job site, work group, department or plant:

1. ***General Electrician (01)***
The employer is allowed a ratio of one (1) apprentice to one (1) journey-level worker per job site, unless one of the following conditions is met:

No more than two apprentices for every journey level Residential (02) or Limited Energy (06) specialty electrician when working in that electrician's specialty.

Apprentices with a minimum of 7,000 hours of OJT will be allowed to work without the direct supervision of a journey-level person provided that they have been issued a six- month, nonrenewable, unsupervised electrical training certificate by the Washington State Labor and Industries Electrical Section. Such apprentices will not be counted for the purposes of a ratio calculation nor be allowed to supervise other apprentices.

Supervision and Ratio of apprentices in the above occupation shall follow requirements established under RCW 19.28.161.

VII. APPRENTICE WAGES AND WAGE PROGRESSION:

A. Apprentices must be paid at least Washington's minimum wage, unless a local ordinance or a collective bargaining agreement require a higher wage. Apprentices must be paid according to a progressively increasing wage scale. The wage scale for apprentices is based on the specified journey-level wage for their occupation. Wage increases are based on hours worked or competencies attained. The sponsor determines wage increases. Sponsors must submit the journey-level wage at least annually or whenever changed to the department as an addendum to these standards. Journey-level wage reports may be submitted on a form provided by the department. Apprentices and others should contact the sponsor or the Department for the most recent Journey-level wage rate.

B. Sponsors can grant advanced standing, and grant a wage increase, when apprentices demonstrate abilities and mastery of their occupation. When advanced standing is granted, the sponsor notifies the employer/training agent of the wage increase the apprenticeship program standard requires.

C. Wage Progression Schedules

1. General Electrician (01)

Step	Hour Range or competency step	Percentage of journey-level wage rate
1	**0000-1000**	**60%**
2	**1001-2000**	**65%**

3	**2001-3000**	**70%**
4	**3001-4000**	**75%**
5	**4001-5000**	**80%**
6	**5001-6000**	**85%**
7	**6001-7000**	**90%**
8	**7001-8000**	**95%**

General Electrician (01) apprentices shall not be paid less than the progressive scale identified within this section regardless the scope of work being performed.

To be advanced to the next wage step, the Committee will discuss, assess and evaluate the apprentice's satisfactory progression and completion per the following documented requirements:

- **Successful progress and/or completion of related training requirements**
- **Satisfactory and current on-the-job training evaluation reports**
- **All monthly work progress reports turned in on time**
- **Completion of OJT hours requirement**
- **Satisfactory Instructor reports**

VIII. WORK PROCESSES:

The apprentice shall receive on the job instruction and work experience as is necessary to become a qualified journey-level worker versed in the theory and practice of the occupation covered by these standards. The following is a condensed schedule of work experience, which every apprentice shall follow as closely as conditions will permit.

The following work process descriptions pertain to the occupation being defined. In no case shall work hours in commercial and industrial be less than 4000 cumulative hours for the term of apprenticeship.

A. General Electrician (01) ***Approximate Hours/Competency Level***

1. ***RESIDENTIAL-wiring of residences, duplexes, and small apartment buildings and necessary pre-fabrication and preparation.....1000***

2. ***COMMERCIAL-wiring of public commercial, school and hospital buildings; the installation and repair of all equipment therein; and necessary pre-fabrication and preparation.....2500***

3. ***INDUSTRIAL-wiring of all industrial buildings and equipment; the maintenance, repair, and alteration of the same; and necessary***

pre-fabrication and preparation	***3000***
4. SPECIALIZED SYSTEMS-wiring of systems which include; sound, data transmission, telephone, fire alarm, fiber optics, energy management, closed circuit television programmable controllers, and nurse call systems.	***1500***
Total Hours/# of Competency Levels:	***8000***

All such work processes shall be performed under the supervision of a journey-level General Electrician 01. Supervision should not be of such nature as to prevent the development of responsibility and initiative.

IX. RELATED/SUPPLEMENTAL INSTRUCTION:

The apprentice must attend related/supplemental instruction (RSI). Time spent in RSI shall not be considered as hours of work and the apprentice is not required to be paid.

RSI must be provided in safe and healthy conditions as required by the Washington Industrial Safety and Health Act and applicable federal and state regulations.

Hours spent in RSI are reported to L&I each quarter. Reports must show which hours are unpaid and supervised by a competent instructor versus all other hours (paid and/or unsupervised) for industrial insurance purposes.

For purposes of coverage under the Industrial Insurance Act, the WSATC is an employer and the apprentice is an employee when an unpaid, supervised apprentice is injured while under the direction of a competent instructor and participating in RSI activities.

If apprentices do not attend required RSI, they may be subject to disciplinary action by the sponsor.

A. The methods of related/supplemental training must be indicated below (check those that apply):

( ) Supervised field trips

( ) Sponsor approved training seminars (specify):

(X) Sponsor approved online or distance learning courses (specify): **Only in excess of the required 144 minimum classroom hours, either web-based and/or blended learning. Lewis and Clark State College, (LCSC), Lewiston, Idaho**

(X) State Community/Technical college **Lewis and Clark State College, Lewiston, Idaho.**

( ) Private Technical/Vocational college

( ) Sponsor Provided (lab/classroom)

(X) Other (specify): **Additional 01 electrical based classes/safety courses as approved by the Committee to include, but not limited to CPR/First Aid, OSHA 10, and required CEU's.**

B. **206** Minimum RSI hours per year defined per the following [see WAC 296-05-015(6)]:

( ) Twelve-month period from date of registration.*
(X) Defined twelve-month school year: **September** through **June)**.
( ) Two-thousand hours of on the job training.

**If no selection is indicated above, the WSATC will define RSI hours per twelve-month period from date of registration.*

C. Additional Information:

1. ***General Electrician (01)***

   The 144 hours identified above shall be 144 hours/year of competent instructor led classroom instruction ("must" include lab or hands-on instruction)
   - ***This requirement includes a minimum of 720 RSI hours over the term of apprenticeship under the same conditions.***
   - ***On-line would not be excluded as a delivery method but could only be offered for hours over the 144 annual minimum/720 cumulative total.***

Upon the apprentice's registration as a student with Lewis and Clark State College, each apprentice will be provided a minimum of 206 RSI hours per year and up to a total of 824 of RSI hours over the course of their apprenticeship.

In the event an apprentice has completed all of their RSI but has less than the required OJT, the apprentice will not be required to attend further classes unless otherwise directed by the committee.

RSI plans shall be updated by the sponsor every five years or as requested by the department to ensure compliance with these standards.

Competent Instructor qualifications shall include the following:

- ***Meets requirements of WAC 296-05-003, excluding the Journey Level Experience requirement***
- ***Meets requirements of WAC 296-46B-970, excluding the following;***
  - ***Manufacturer/Vendor representative when not accompanied by Competent Instructor***
  - ***Electrical Administrator with no Journey level trade qualification***

X. ADMINISTRATIVE/DISCIPLINARY PROCEDURES:

A. Administrative Procedures:

The sponsor may include in this section a summary and explanation of administrative actions performed at the request or on the behalf of the apprentice. Such actions may include but are not limited to:

1. Voluntary Suspension: A temporary interruption in progress of an individual's apprenticeship agreement at the request of the apprentice and granted by the sponsor. The program sponsor shall review apprentices in suspended status at least once each year to determine if the suspension is still appropriate.

2. Advanced Standing or Credit: The sponsor may provide for advanced standing or credit for demonstrated competency, acquired experience, training or education in or related to the occupation. All sponsors need to ensure a fair and equitable process is applied to all apprentices seeking advanced standing or credit per WAC 296-05-015(11).

3. Sponsor Procedures:

   a. A daily record of hours worked in each category of on the job training will be maintained by the apprentice and the apprentice's supervisor will "sign-off" the apprentice's record of hours worked in each category every week. Apprentice's shall submit a completed monthly on the job training record to the Training Coordinator by the 5th for the previous month. Overtime hours worked shall be recorded as actual hours worked.

   b. The apprentice will meet with their supervisor and Management on a quarterly basis to review their progress.

   c. The progress of each apprentice will be reviewed and recorded at least monthly by the apprentice's supervisor. The supervisor shall make these records available to the apprenticeship committee for the evaluation of each apprentice progress on the job and in related supplemental instruction.

The committee will evaluate the apprentice's knowledge, skills and abilities and provide appropriate additional related instruction to assure that competency is acquired in each work process. The evaluation and summary of the additional instruction will be noted in the apprentice's file.

d. At the end of each progression period of employment, the Committee shall examine and take action on each apprentice to approve advancement, extend present rating, or cancel his/her registration.

e. Apprentices will apply themselves on the job and in related training programs and continually strive to become a skilled worker.

f. Apprentices must complete all required on-the-job training, known as Work Processes, and complete the education, learning and testing, known as Related Supplemental Instruction, as indicated in this standard to be eligible for a Certificate of Completion.

g. Schweitzer Engineering Laboratories 01 Electrician, also known as the employer and sponsor, shall select and employ only registered apprentices secured from the Committee.

B. Disciplinary Procedures

1. The obligations of the sponsor when taking disciplinary action are as follows:

   a. The sponsor shall be responsible for enacting reasonable policies and procedures and applying them consistently. The sponsor will inform all apprentices of their rights and responsibilities per these standards.

   b. The sponsor shall notify the apprentice of intent to take disciplinary action and reasons therefore 20 calendar days prior to taking such action. The reason(s) supporting the sponsor's proposed action(s) must be sent in writing to the apprentice.

   c. The sponsor must clearly identify the potential outcomes of disciplinary action, which may include but are not limited to discipline, suspension or cancellation of the apprenticeship agreement.

   d. The decision/action of the sponsor will become effective immediately.

2. The sponsor may include in this section requirements and expectations of the apprentices and an explanation of disciplinary actions imposed for noncompliance. The sponsor has the following disciplinary procedures to adopt:

   a. Disciplinary Probation: A time assessed when the apprentice's progress is not satisfactory. During this time the sponsor may withhold periodic wage advancements, suspend or cancel the apprenticeship agreement, or take further

disciplinary action. A disciplinary probation may only be assessed after the initial probation is complete.

b. Disciplinary Suspension: A temporary interruption in the progress of an individual's apprenticeship agreement. Conditions will include not being allowed to participate in On-the-Job Training (OJT), go to Related Supplemental Instruction (RSI) classes or take part in any activity related to the Apprenticeship Program until such time as the sponsor takes further action. The program sponsor shall review apprentices in such status at least once each year.

c. Cancellation: Refers to the termination of an apprenticeship agreement at the request of the apprentice, supervisor, or sponsor. [WAC 296-05-003].

3. Sponsor Disciplinary Procedures:

a. Failure to maintain employment with Schweitzer Engineering Laboratories employment policies and this approved standard will result in the cancellation of the apprenticeship agreement. The department and employer shall be timely notified of such action.

b. If the apprentice fails courses for any related supplemental learning and testing period/module, a defined quorum of the committee will meet to review the apprentice's situation. At this point, the Committee will make the decision whether to implement procedures under Section X.C. Administrative/Disciplinary Procedures. The apprentice will have the opportunity to present his/her case and/or possible resolution. The Committee will consider hardships (i.e. a death in the family) on a case by case basis with proper documentation.

C. Apprentice Complaint Procedures:

1. The apprentice must complete his/her initial probationary period in order to be eligible to file a complaint (WAC 296-05-105).

2. Complaints involving matters covered by a collective bargaining agreement are not subject to the complaint procedures in this section.

3. Complaints regarding non-disciplinary matters must be filed with the program sponsor within 30 calendar days from the date of the last occurrence. Complaints must be in writing.

4. If the apprentice disagrees with the resolution of the complaint or wishes to contest the outcome of a disciplinary action by the program sponsor, the apprentice must file a written request for reconsideration with the program sponsor within 30 calendar days from the date the apprentice received written notice of action by the program sponsor.

5. The program sponsor must reply, in writing, to the request for reconsideration within 30 calendar days from the date the program sponsor receives the request. The program sponsor must send a copy of the written reply to the apprentice within the 30 calendar days.

6. If the apprentice disagrees with the program sponsor's decision, the apprentice may file an appeal with the Apprenticeship Program, (WAC 296-05-105). If the apprentice does not timely file an appeal, the decision of the program sponsor is final after 30 calendar days from the date the program sponsor mails the decision to the apprentice. See section "D" below.

D. Apprentice Complaint Review/Appeals Procedures:

1. If the apprentice disagrees with the program sponsor's decision, the apprentice must submit a written appeal to L&I's apprenticeship section within 30 calendar days from the date the decision is mailed by the program sponsor. Appeals must describe the subject matter in detail and include a copy of the program sponsor's decision.

2. The L&I apprenticeship section will complete its investigation within 30 business days from the date the appeal is received and attempt to resolve the matter.

3. If the Apprenticeship section is unable to resolve the matter within 30 business days, the Apprenticeship section issues a written decision resolving the appeal.

4. If the apprentice or sponsor is dissatisfied with L&I's decision, either party may request the WSATC review the decision. Requests for review to the WSATC must be in writing. Requests for review must be filed within 30 calendar days from the date the decision is mailed to the parties.

5. The WSATC will conduct an informal hearing to consider the request for review.

6. The WSATC will issue a written decision resolving the request for review. All parties will receive a copy of the WSATC's written decision.

XI. SPONSOR – RESPONSIBILITIES AND GOVERNING STRUCTURE

The following is an overview of the requirements associated with administering an apprenticeship program. These provisions are to be used with the corresponding RCW and/or WAC. The sponsor is the policymaking and administrative body responsible for the operation and success of this apprenticeship program. The sponsor may assign an administrator or a committee to be responsible for day-to-day operations of the apprenticeship program. Administrators and/or committee members must be knowledgeable in the process of apprenticeship and/or the application of chapter 49.04 RCW and chapter 296-05 WAC and these standards. If applicable, sponsors must develop procedures for:

A. Committee Operations (WAC 296-05-009): (Not applicable for Plant Programs)
Apprenticeship committees must be composed of an equal number of management and non-management representatives from a minimum of four to a maximum of twelve members. Committees must convene meetings at least three times per year attended by a quorum of committee members as defined in these approved standards.

B. Program Operations
The sponsor will record and maintain records pertaining to the administration of the apprenticeship program and make them available to the WSATC or Department upon request. Records required by WAC 296-05-100 will be maintained for five (5) years; all other records will be maintained for three (3) years. Apprenticeship sponsors will submit required forms/reports to the Department of Labor and Industries through one of the two prescribed methods below:

Sponsors shall submit required reports through assigned state apprenticeship consultant.

Sponsors shall submit required forms/reports through the Apprentice Registration and Tracking System (ARTS).

1. The following is a listing of forms/reports for the administration of apprenticeship programs and the time-frames in which they must be submitted:

   a. Apprenticeship Agreements – within first 30 days of employment
   b. Authorization of Signature forms - as necessary
   c. Approved Training Agent Agreements– within 30 days of sponsor action
   d. Minutes of Apprenticeship Committee Meetings – within 30 days of sponsor approval (not required for Plant program)
   e. Request for Change of Status - Apprenticeship/Training Agreement and Training Agents forms – within 30 days of action by sponsor.
   f. Journey Level Wage Rate – annually, or whenever changed as an addendum to section VII. Apprentice Wages and Wage Progression.
   g. Related Supplemental Instruction (RSI) Hours Reports (Quarterly):
      1st quarter: January through March, due by April 10
      2nd quarter: April through June, due by July 10
      3rd quarter: July through September, due by October 10
      4th quarter: October through December, due by January 10
   h. On-the-Job Work Hours Reports (bi-annual)
      1st half: January through June, by July 30
      2nd half: July through December, by January 31

2. The program sponsor will adopt, as necessary, local program rules or policies to administer the apprenticeship program in compliance with these standards. Requests for revision to these standards of apprenticeship must be submitted 45 calendar days prior to a quarterly WSATC meeting. The Department of Labor and Industries,

Apprenticeship Section's manager may administratively approve requests for revisions in the following areas of the standards:

a. Program name
b. Sponsor's introductory statement
c. Section III: Conduct of Program Under Washington Equal Employment Opportunity Plan
d. Section VII: Apprentice Wages and Wage Progression
e. Section IX: Related/Supplemental Instruction
f. Section XI: Sponsor – Responsibilities and Governing Structure
g. Section XII: Subcommittees
h. Section XIII: Training Director/Coordinator

3. The sponsor will utilize competent instructors as defined in WAC 296-05-003 for RSI. Furthermore, the sponsor will ensure each instructor has training in teaching techniques and adult learning styles, which may occur before or within one year after the apprenticeship instructor has started to provide instruction.

C. Management of Apprentices:

1. Each apprentice (and, if under 18 years of age, the parent or guardian) will sign an apprenticeship agreement with the sponsor, who will then register the agreement with the Department before the apprentice attends RSI classes, or within the first 30 days of employment as an apprentice. For the purposes of industrial insurance coverage and prevailing wage exemption under RCW 39.12.021, the effective date of registration will be the date the agreement is received by the Department.

2. The sponsor must notify the Department within 30 days of all requests for disposition or modification to apprentice agreements, which may include:

a) Certificate of completion
b) Additional credit
c) Suspension (i.e. military service or other)
d) Reinstatement
e) Cancellation
f) Corrections
g) Step Upgrades
h) Probation Completion date
i) Other (i.e., name changes, address)
j) Training Agent Cancellation

3. The sponsor commits to rotate apprentices in the various processes of the skilled occupation to ensure the apprentice is trained to be a competent journey-level worker.

4. The sponsor shall periodically review and evaluate apprentices before advancement to the apprentice's next wage progression period. The evidence of such advancement

will be the record of the apprentice's progress on the job and during related/supplemental instruction.

5. The sponsor has the obligation and responsibility to provide, insofar as possible, reasonably continuous employment for all apprentices in the program. The sponsor may arrange to transfer an apprentice from one training agent to another or to another program when the sponsor is unable to provide reasonably continuous employment, or they are unable to provide apprentices the diversity of experience necessary for training and experience in the various work processes as stated in these standards. The new training agent will assume all the terms and conditions of these standards. If, for any reason, a layoff of an apprentice occurs, the apprenticeship agreement will remain in effect unless canceled by the sponsor.

6. An apprentice who is unable to perform the on-the-job portion of apprenticeship training may, if the apprentice so requests and the sponsor approves, participate in related/supplemental instruction, subject to the apprentice obtaining and providing to the sponsor written requested document/s for such participation. However, time spent will not be applied toward the on-the-job portion of apprenticeship training.

7. The sponsor shall hear and decide all complaints of violations of apprenticeship agreements.

8. Upon successful completion of apprenticeship, as provided in these standards, and passing the examination that the sponsor may require, the sponsor will recommend the WSATC award a Certificate of Completion of Apprenticeship. The sponsor will make an official presentation to the apprentice who has successfully completed his/her term of apprenticeship.

D. Training Agent Management:

1. The sponsor shall offer training opportunities for apprentices by ensuring reasonable and equal working and training conditions are applied uniformly to all apprentices. The sponsor shall provide training at an equivalent cost to that paid by other employers and apprentices participating in the program. The sponsor shall not require an employer to sign a collective bargaining agreement as a condition of participation.

2. The sponsor must determine whether an employer can adequately furnish proper on the job training to an apprentice in accordance with these standards. The sponsor must also require any employer requesting approved training status to complete an approved training agent agreement and to comply with all federal and state apprenticeship laws, and these standards.

3. The sponsor will submit training agent agreements to the Department with a copy of the agreement and/or the list of approved training agents within thirty calendar days

from the effective date. Additionally, the sponsor must submit rescinded training agent agreements to the Department within thirty calendar days of said action.

E. Committee governance (if applicable): (see WAC 296-05-009)

1. Apprenticeship committees shall elect a chairperson and a secretary who shall be from opposite interest groups, i.e., chairperson-employers; secretary-employees, or vice versa. If the committee does not indicate its definition of quorum, the interpretation will be "50% plus 1" of the approved committee members. The sponsor must also provide the following information:

   a. Quorum: **50% plus 1**

   b. Program type administered by the committee: **INDIVIDUAL NON-JOINT**

   c. The employer representatives shall be:

Nathan Tumelson, Secretary	**Monte Carper**
2350 NE Hopkins Ct.	**2350 NE Hopkins Ct.**
Pullman, WA 99163	**Pullman, WA 99163**

   d. The employee representatives shall be:

Patrick Niehenke, Chair	**Dustin Hardy**
2350 NE Hopkins Ct.	**2350 NE Hopkins Ct.**
Pullman, WA 99163	**Pullman, WA 99163**

F. Plant programs

For plant programs the WSATC or the Department designee will act as the apprentice representative. Plant programs shall designate an administrator(s) knowledgeable in the process of apprenticeship and/or the application of chapter 49.04 RCW and chapter 296-05 WAC and these standards.

The designated administrator(s) for this program is/are as follows:
NONE

XII. SUBCOMMITTEE:

Subcommittee(s) approved by the Department, represented equally from management and non-management, may also be established under these standards, and are subject to the main committee. All actions of the subcommittee(s) must be reviewed by the main committee. Subcommittees authorized to upgrade apprentices and/or conduct disciplinary actions must be structured according to the same requirements for main committees.

NONE

XIII. TRAINING DIRECTOR/COORDINATOR:

The sponsor may employ a person(s) as a full or part-time training coordinator(s)/ training director(s). This person(s) will assume responsibilities and authority for the operation of the program as are delegated by the sponsor.

Nathan Tumelson
2350 NE Hopkins Ct.
Pullman WA 99163

Must be designated by the sponsor for electrical training programs

Teri Gardner 6-6-22

Department of Labor & Industries
Apprenticeship Section
PO Box 44530
Olympia WA 98504-4530

Journey Level Wage Rate

From which apprentices' wages rates are computed

TO: Washington State Apprenticeship & Training Council

From Schweitzer Engineering Laboratories 01 Electrician
(NAME OF STANDARDS)

Occupations	County(s)	Journey Level Wage Rate	Effective Date:
General Electrician 01	Whitmand and Spokane counties in Washington, and Nez Perce, Latah and Ada counties in Idaho.	$25.58	1.1.22

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rec'd 3.7.2022 eml L&I Apprenticeship Consultant	Teri Gardner 6-6-22 L&I Admin

Department of Labor and Industries
Apprenticeship Section
PO Box 44530
Olympia WA 98504-4530

Apprenticeship Committee Representative Qualifications

The Apprenticeship Committee is responsible for the day-to-day operations of the apprenticeship and training program and operating the program consistent with the standards of apprenticeship. Pursuant to WAC 296-05-009, the Representative listed below shall be familiar with the applicable apprenticeship standards.

Name of Program
Schweitzer Engineering Laboratories 01 Electrician

Committee Representative Name	Committee Representative Signature
Monte Carper	Mont Carper

☒ Employer Representative ☐ Employee Representative (*Does not have the authority to hire or fire*)

Work Experience

Position (most recent first)	Employer / Organization	From (mm/yy)	To (mm/yy)
Regional Property Operations Manager	Schweitzer Engineering Laboratories	7/2019	Present
Senior Property Operations Manager	Schweitzer Engineering Laboratories	1/2018	7/2019
Property Operations Manager	Schweitzer Engineering Laboratories	1/2012	1/2018
HVAC Technician	Schweitzer Engineering Laboratories	2/2006	1/2012
HVAC Teechnician	Schweitzer Engineering	2/1995	2/2006
Start-Up & Control Technician	Pacific Rim Mechanical	10/1993	1/1995

Education History

Name of Training and/or School (most recent first)	Completed Date (mm/yy)	Program of Study	Degree or Certification Awarded
Low Pressure Boiler	8/1996	Low Pressure Boiler Tech, online	Certification

Other Technical Certifications or Licenses Held

EL 06A HVAC/RFRG Washington Specialties Electrician: CARPEMV991JG

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Department of Labor and Industries
Apprenticeship Section
PO Box 44530
Olympia WA 98504-4530

Apprenticeship Committee Representative Qualifications

The Apprenticeship Committee is responsible for the day-to-day operations of the apprenticeship and training program and operating the program consistent with the standards of apprenticeship. Pursuant to WAC 296-05-009, the Representative listed below shall be familiar with the applicable apprenticeship standards.

Name of Program
Schweitzer Engineering Laboratories 01 Electrician

Committee Representative Name	Committee Representative Signature
Dustin Hardy	Dustin Hardy

☐ Employer Representative ☒ Employee Representative (*Does not have the authority to hire or fire*)

Work Experience

Position (most recent first)	Employer / Organization	From (mm/yy)	To (mm/yy)
Trades Professional	Schweitzer Engineering Laboratories	1/22	Present
01 Journeyman Electician	M&M Harrison Electric	12/12	1/22

Education History

Name of Training and/or School (most recent first)	Completed Date (mm/yy)	Program of Study	Degree or Certification Awarded
CITC	6/22/17	Electrical Apprenticeship	Completion Certificate

Other Technical Certifications or Licenses Held

Washington (EL 01) Journeyman License: HARDYDB833CC & Idaho Electrical 01 Journeyman

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Department of Labor and Industries
Apprenticeship Section
PO Box 44530
Olympia WA 98504-4530

Apprenticeship Committee Representative Qualifications

The Apprenticeship Committee is responsible for the day-to-day operations of the apprenticeship and training program and operating the program consistent with the standards of apprenticeship. Pursuant to WAC 296-05-009, the Representative listed below shall be familiar with the applicable apprenticeship standards.

Name of Program
Schweitzer Engineering Laboratories Electrician 01

Committee Representative Name	Committee Representative Signature
Patrick Niehenke	Patrick Niehenke

☐ Employer Representative ☒ Employee Representative (*Does not have the authority to hire or fire*)

Work Experience

Position (most recent first)	Employer / Organization	From (mm/yy)	To (mm/yy)
Master Trades	Schweitzer Engineering Laboratories	11/21	Present
Property Maint	Schweitzer Engineering Laboratories	9/10	11/21
Property Tech	Schweitzer Engineering Laboratories	11/04	9/10

Education History

Name of Training and/or School (most recent first)	Completed Date (mm/yy)	Program of Study	Degree or Certification
Lewis and Clark State College	9/2014	Electrician Apprenticeship	Certification

Other Technical Certifications or Licenses Held

EL Journey Level 01 License: NIEHEPJ853QW

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Department of Labor and Industries
Apprenticeship Section
PO Box 44530
Olympia WA 98504-4530

Apprenticeship Committee Representative Qualifications

The Apprenticeship Committee is responsible for the day-to-day operations of the apprenticeship and training program and operating the program consistent with the standards of apprenticeship. Pursuant to WAC 296-05-009, the Representative listed below shall be familiar with the applicable apprenticeship standards.

Name of Program
Schweitzer Engineering Laboratories 01Electrician

Committee Representative Name	Committee Representative Signature
Nathan Tumelson	

☒ Employer Representative ☐ Employee Representative (*Does not have the authority to hire or fire*)

Work Experience

Position (most recent first)	Employer / Organization	From (mm/yy)	To (mm/yy)
Senior Prop Su	Schweitzer Engineering Laboratories	2/2019	Present
Prop Op Sup	Schweitzer Engineering Laboratories	4/2017	9/2019
Prop Tech 4	Schweitzer Engineering Laboratories	8/2016	4/2017
HVAC Jman	Mikes Heating and Air Conditioning	11/2002	8/2016

Education History

Name of Training and/or School (most recent first)	Completed Date (mm/yy)	Program of Study	Degree or Certification
Lwewis and Clark State College	5/2008	HVAC Apprenticeship	Certificate

Other Technical Certifications or Licenses Held

EL6A HVAC/Refrig Electrical License Washington State: TUMLELND903NJ
HVAC Journeyman License of Idaho
Gas Heating Mechanic 1
EPA Type II Refrigeration License and Plumbing Specialty Journeyman License of Idaho

rec'd 06.14.2022
eml

Apprenticeship Related/Supplemental Instruction (RSI) Plan Review

Program Sponsor Schweitzer Engineering Laboratories 01 Electrician	RECEIVED By Teri Gardner at 9:01 am, Jun 15, 2022
Skilled Occupational Objective General Electrician (01)	
Term/OJT Hours 8000	Total RSI Hours 824
Training Provider Lewis-Clark State College	

By the signature placed below, the **program sponsor** agrees to provide the prescribed RSI for each registered apprenticeship and assures that:

1. The RSI content and delivery method is and remains reasonably consistent with the latest occupational practices, improvements, and technical advances.
2. The RSI is coordinated with the on-the-job work experience.
3. The RSI is provided in safe and healthful work practices in compliance with WISHA and applicable federal and state regulations.

Nathan Tumelson - SEL
Printed Name of Program Sponsor

Nathan Tumelson 6/14/22
Signature of Program Sponsor

By the signature placed below, the **training provider** assures that:

1. The RSI will be conducted by instructors who meet the qualifications of "competent instructor" as described in WAC 296-05-003.
    a. Has demonstrated a satisfactory employment performance in his/her occupation for a minimum of three years beyond the customary learning period for that occupation; and
    b. Meets the State Board for Community and Technical Colleges requirements for a professional technical instructor (see WAC 131-16-080 through -094), or be a subject matter expert, which is an individual, such as a journey worker, who is recognized within the industry as having expertise in a specific occupation; and
    c. Has training in teaching techniques and adult learning styles, which may occur before or within one year after the apprenticeship instructor has started to provide the related technical instruction.
2. If using alternative forms of instruction, such as correspondence, electronic media, or other self-study, such instruction is clearly defined.

Julie Crea
Print Name Training Provider

Signature of Training Provider

Vice President for Finance and Administration
Title of Training Provider

Lewis-Clark State College
Organization of Training Provider

If there are additional training providers, please provide information and signatures on the next page.

Additional Resources: *Apprenticeship Related Supplemental Instruction (RSI) Plan Review Glossary of Term (F100-519-000) and Apprenticeship Related Supplemental Instruction (RSI) Plan Review Criteria (F100-521-000).*

SBCTC Program Administrator has reviewed RSI plan and recommendations of the Trade Committee.

Click or tap here to enter text.
Print Name of SBCTC Program Administrator

Signature of SBCTC Program Administrator

Date

☐ SBCTC recommends approval

☐ SBCTC recommends return to sponsor

Additional Training Providers (if necessary)

Click or tap here to enter text.
Print Name Training Provider

Signature of Training Provider

Click or tap here to enter text.
Title of Training Provider

Click or tap here to enter text.
Organization of Training Provider

Click or tap here to enter text.
Print Name Training Provider

Signature of Training Provider

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Organization of Training Provider

Click or tap here to enter text.
Print Name Training Provider

Signature of Training Provider

Click or tap here to enter text.
Title of Training Provider

Click or tap here to enter text.
Organization of Training Provider

Program Sponsor:	Skilled Occupational Objective:
Schweitzer Engineering Laboratories 01 Electrician	General Electrician (01)

Note: The description of each element must be in sufficient detail to provide adequate information for review by the SBCTC and Review Committee. To add more elements, click on the plus sign that appears below the "Description of element/course" field.

Describe minimum hours of study per year in terms of (check one):

☐ 12-month period from date of registration.

☒ Defined 12-month school year.

☐ 2,000 hours of on-the-job training.

Element/course: **Introduction to Electrical Work: Safety General Safety Rules On-The-Job Safety (YEAR 1)**	Planned Hours: 23

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- State basic on-the-job safety rules
- Explain what a material safety data sheet (MSDS) is and its requirements.
- Explain safety procedures for trenches
- Explain safety for confined space
- Explain lockout and tagout
- Explain protective clothing to include eye and hearing protection
- Explain the use of a safety harness
- Explain safety for ladders and scaffolds
- State the purpose of arc-fault and ground-fault circuit interrupters

Element/course: **Electrical Theory: Atomic Structure, Electrical Qualities, and Ohm's Law. (YEAR 1)**	Planned Hours: 9

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Explain the structure of the atom
- Explain electron flow
- State the difference between insulators and semiconductors
- Explain the basic methods of producing electricity
- Describe electrical effects such as magnetism, light, and heat.
- Define a coulomb
- Define an ampere
- Define an ohm
- Define an watt
- Calculate different electrical values using Ohm‟s law.
- Select the proper Ohm‟s law formula from a chart.

Element/course: **Static Electricity and Magnetism, and Resistors (YEAR 1)**	Planned Hours: 6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Discuss the nature of static electricity
- Discuss lighting protection
- Give examples of both nuisance and useful static charges
- Discuss the properties of permanent magnets
- Discuss the operation of electromagnets
- Determine the polarity of an electromagnet when the direction of the current is known
- Determine the resistance of a resistor using the color code or an ohmmeter
- Determine whether a resistor is operating within its power rating

Element/course: **Series Circuits (YEAR 1)**	Planned 9 Hours:

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Discuss the properties of series circuits
- List three rules for solving electrical values of series circuits
- Calculate values of voltage, current, resistance, and power for series circuits

Element/course: **Parallel Circuits (YEAR 1)**	Planned 9 Hours:

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Discuss the characteristics of parallel circuits
- State three rules for solving electrical values of parallel circuits
- Solve the missing values in a parallel circuit using the three rules and Ohm"s law
- Calculate current values using the current divider formula

Element/course: **Combination Circuits (Year 1)**	Planned Hours: 15

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Define a combination circuit
- List the rules for parallel circuits
- List the rules for series circuits
- Solve combination circuits using the rules for parallel circuits, rules for series circuits, and Ohm"s law

Element/course:	**Electrical Testing Equipment (YEAR 1)**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Use an ohm meter and measure any resistance in electrical equipment or conductor
- Measure voltage between phases and phase to ground
- Take an ampere reading of any load
- Diagram the proper connection of a watt meter
- State the operation characteristics of analog and digital meters
- Recognize the wave form on an oscilloscope

Element/course:	**Introduction to the National Electrical Code and Definitions NEC Articles 90 and 100 (YEAR 1)**	Planned Hours:	9

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Understand how the NEC began and its purpose
- Understand how changes to the code evolve
- Be familiar with the terminology, presentation, and format of the NEC
- State the roles of nationally recognized testing laboratories, the National Electrical Manufactures Association, and the National Fire Protection Association
- Accurately evaluate a location as accessible, readily accessible, or not readily accessible
- Identify equipment classified as appliances
- State the four categories of branch circuits
- State the difference between a continuous load and a non-continuous load
- State the difference between a branch circuit and a feeder
- State the difference between „grounded" and „grounding"
- Define what "in sight" means in the NEC
- Give examples of damp, wet, and dry locations using the code book
- Determine which conductors are the neutral conductors
- Define a separately derived system using the NEC

Element/course:	**Boxes and Enclosures (YEAR 1)** **References: Objectives to be taught from NEC Articles 312, 314, 382, and other appropriate NEC sections.**	Planned Hours:	9

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Determine the cubic inch capacity of boxes when installing conductors # 6 AWG and smaller
- State which items replace volume allowances of conductor fill when calculating box fill
- State how identical switches or receptacles can be mounted side by side in a two gang box can have different cubic-inch volume allowances
- Determine the box size when the number of conductors is known
- Know the minimum conductor length to be left inside a box
- Explain what must be accessible after installation
- State the mounting and supporting provisions for boxes and conduit bodies using the NEC
- Determine the type of box needed for various applications using the NEC
- Calculate for junction box sizing containing #4 AWG and larger conductors using the NEC

Element/course:	**Cables (YEAR 1)** **References: Objectives to be taught from NEC Articles 320 through 340 and other appropriate NEC sections**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components Electrical Safety
- State the distance from the wood framing member a cable can be installed unless a steel plate is installed
- State the requirements for protection of cable in metal framing using the NEC
- State the sealing requirements in fire-resistant-rated construction when electrical penetrations are made
- Identify what cables are permitted in spaces used for environmental air
- Determine the support requirements for MC, AC, and nonmetallic-sheathed cable using the NEC
- Identify the conductors in a cable and us the NEC to state how certain conductors can be re-identified
- Determine underground installation provisions the NEC
- Identify special application cables using the NEC (This is not to be for installation requirements as this is for first year students)

Element/course:	**Raceways and Conductors (YEAR 1)** **References: Objectives are based in NEC Sections 110.14, 240.4, 300.19; and NEC Articles 310, 342 through 378, Chapter 9 tables, and other appropriate NEC sections.**	Planned Hours: 6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Determine the general provisions for any raceway installation using the NEC
- Determine the type of raceways suited for individual installations
- Determine the support requirements for various raceways using the NEC
- Determine the provisions for nonmetallic and flexible conduit using the NEC
- Successfully calculate the electrical trade size conduit required for any circuit or feeder
- Determine basic conductor properties using the NEC
- Show conductor temperature limitations
- Determine the provisions for conductors connected in parallel
- Apply conductor ampacity correction factors to include continuous loads.

Element/course:	**General Provisions for One-Family Dwellings (YEAR 1)** **References: Objectives are based in NEC Articles 210, 250, 314, 402, 404, 406, 410, 422, and other appropriate NEC sections.**	Planned Hours: 6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Calculate the minimum number of 15 and 20 amp branch circuits in a one-family dwelling
- Determine the requirements for single receptacles on individual branch circuits
- Determine the branch-circuit ratings allowed for general-purpose receptacles
- Demonstrate the layout of general-purpose receptacles in a dwelling
- Determine the receptacle rating allowed on various size branch circuits using the NEC
- Determine the requirements for wet bar receptacles using the NEC
- Determine the requirements for lighting and switching using the NEC
- Determine how and when to use the white conductor as an ungrounded conductor
- Determine any general requirement for boxes using the NEC
- Determine any illumination requirement for entrances and exits
- Determine the allowable use of vegetation such as trees for the mounting of outlets.

Element/course:	**Specific Provisions for One-Family Dwellings (YEAR 1)** **References: Objectives are based in NEC Articles 210, 410, 422, and other appropriate NEC sections.**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Determine the required ampere rating for any receptacle or branch circuit in kitchens, pantries, dining rooms, breakfast rooms, and similar locations
- Determine the requirements for counter top receptacle placement using the NEC.
- State the minimum number of utility circuits required and their application
- Determine the requirements for appliances both cord and plug and permanently connected
- Calculate the load requirements for appliance branch circuits
- State the specific provisions for GFCI placement
- Identify luminaries permitted in closets and its placement
- Define a bathroom by the NEC and discuss the circuit requirements for receptacles, lights and fans
- Determine the requirements for receptacles and lighting in attached garages, detached garages, and basements
- Determine the requirements for laundry rooms to include the clothes dryer
- Determine the lighting and receptacle requirements for attic, crawl space, and HVAC equipment.

Element/course:	**Load Calculations for One-Family Dwellings (YEAR 1)** **References: Objectives are based in NEC Articles 210, 220, 310 and other appropriate NEC sections.**	Planned Hours:	12

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Calculate the general lighting for a one-family dwelling
- Specify the volt-amp requirements for small appliance and laundry branch circuits
- Apply demand factors to the general lighting load
- Apply demand factors to fastened-in-place appliances
- Calculate feeder demand loads for household clothes dryers
- Calculate feeder demand loads for household cooking equipment
- Calculate feeder demand loads for heating and air conditioning
- Calculate a one-family dwelling or feeder using the standard method
- Calculate a one-family dwelling or feeder using the optional method
- Size service and feeder conductors
- Calculate the minimum size neutral conductor
- Select the proper grounding electrode conductor

Element/course:	**Services and Electrical Equipment for One Family Dwellings (YEAR 1)** **References: Objectives are based in NEC Articles 110, 225, 230, 240, 250, 300, 310 and other appropriate NEC sections.**	Planned Hours: 9

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Determine adequate strength for a mast supporting service-drop conductors
- Explain the use of service-entrance cable, though it is used little in the western U.S.
- Define a service lateral and briefly explain its provisions
- Determine clearances for service and outside overhead wiring
- Determine work space required for electrical equipment, services, and panels
- Define a panelboard, an enclosure, and a cutout box
- Determine the proper application and use of circuit breakers and fuses using the NEC
- Determine the appropriate table (310.15(B)(7) or 310.15(B)(16) for conductor sizing
- Size the grounding electrode conductor, equipment grounding conductor, main bonding jumper, bonding jumpers on the supply side or load side of the main breaker or fuse on any one-family dwelling service
- Properly install grounded and grounding conductors in subpanels
- Prevent objectionable current flow in grounding conductors and equipment
- Properly install a panelboard in a separate building or structure

Element/course:	**Comprehensive Provisions for Multifamily Dwellings (YEAR 1)** **References: Objectives are based in NEC Articles 210, 230, 240, 310, Chapter 9, Tables 8 and 9, and other appropriate NEC sections.**	Planned Hours: 9

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Determine when more than one service can be installed on a multifamily building
- Determine the proper number of disconnects allowed on a service
- Determine proper access to a units disconnecting means by any occupant
- Properly install the grounding electrode conductors to the grounding electrode
- Determine the proper use of tables 310.15(B)(7) and 310.15(B)(16) when sizing service and feeder conductors
- Determine outdoor receptacle placement
- Calculate voltage-drop (The use of Ugly‘s Electrical Reference is strongly recommended)

Element/course:	**Hand Bending Conduit (YEAR 1)** **References:** **www.mikeholt.com/documents/freestuff/BendingRoundRaceways.pdf** or publications from manufactures such as Ideal, Greenlee, etc.	Planned Hours: 3

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Properly use a hand bender
- Create a 90 degree the correct length using a hand bender
- Bend an offset for any measurement
- Create a saddle bend
- Have the confidence to begin running conduit under supervision on the job

Element/course:	**Commercial Locations: General Provisions (YEAR 1)** **References: Objectives are based in NEC Articles 210, 220, 310, 410, 600, and other appropriate NEC sections.**	Planned Hours: 6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Compare receptacle placement with that of one-family dwellings to show the difference
- Determine the receptacle requirements in a commercial bathroom
- Determine the sign outlet requirements in a commercial installation
- Determine the branch circuit requirements for motors and air conditioning
- Determine the volt-amp ratings for receptacles (single, duplex, quad, etc.)
- Determine the maximum number of receptacles permitted on a 15 amp and 20 amp circuit
- Apply accessibility requirements to receptacles in guest rooms of hotels and motels
- Determine showcase and show window requirements using the NEC
- Calculate general lighting load based on square-foot area
- Determine the provisions for florescent, HID, recessed, and track lighting provisions
- Determine the proper use and restrictions when using luminaries as raceways
- Determine metal pole conductor access requirements

Element/course:	**Commercial Locations: Services, Feeders and Provisions (YEAR 1)** **References: Objectives are based in NEC Articles 110, 250, 368, 408, and other appropriate NEC sections.**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Determine minimum vertical clearances for each installation using the NEC
- Apply dedicated space requirements to electrical equipment to include the area that is to be clear of foreign systems unless protection is provided
- Determine the working clearances of any installation using the NEC
- Properly install both grounding and grounded conductors on the line side and load side of the service supply conductors
- Determine the conditions that require ground-fault protection of equipment
- Recognize a transformer and a generator separately derived system
- Properly ground and bond a separately derived system
- Recognize and explain the use of busways

Element/course:	**Hazardous Locations: Overview (YEAR 1)** **References: Objectives are based in NEC Articles 500 through 516**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
The following areas of study are to be considered introductory to first year students and should be treated as such.
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Explain what a hazardous location is
- Determine if a classified location is Class I, II or III and if it is Division 1 or 2 using the NEC
- Determine the provisions pertaining to commercial garages and repair and storage facilities using the NEC
- Determine the provisions for buildings in which aircraft are stored and repaired
- Determine the provisions for a motor fuel dispensing facility

Element/course: **Health Care (YEAR 1)**	Planned Hours: 6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:

The following areas of study are to be considered introductory to firstyear students and should be treated as such.

At the completion of this lesson the student should be able to:

- Discuss basic health care terminology
- Determine the grounding and bonding requirements of any health care facility
- Identify patient care areas as general care or critical care and their branch circuit requirements
- Determine the tamper-resistant requirements of pediatric facilities
- Define the two types of systems (equipment and emergency)

Element/course: **Special Occupancies (YEAR 1)** **References: Objectives are based in NEC Articles 500 through 516**	Planned Hours: 6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:

The following areas of study are to be considered introductory to first year students and should be treated as such.

At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Define “places of assembly” according to the NEC
- Determine manufactured building requirements
- Determine agricultural building requirements
- Determine requirements for mobile home parks and recreational vehicle parks

Element/course: **REVIEW: Ohm’s Law and Series, Parallel and Co mbination Circuits (Year 2)**	Planned Hours: 6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:

At the completion of this lesson the student should be able to:

- Demonstrate basic competencies in calculating series, parallel, and combination circuits using the Ohm’s law wheel

Element/course: **Basic Trigonometry (Year 2)**	Planned Hours: 6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Define a right triangle
- Use the Pythagorean theorem to solve problems concerning right triangles
- Solve problems using sines, cosines, and tangents

Element/course: **Alternating Current (Year 2)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Discuss the difference between AC and DC
- Compute instantaneous values of voltage and current for a sine wave
- Compute peak, RMS, and average values of voltage and current
- Define the phase relationship of voltage and current in a pure resistive circuit

Element/course: **Inductance in AC Circuits (Year 2)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Define the properties of inductance in an AC circuit
- Discuss inductive reactance
- Calculate the values of inductive reactance and inductance
- Define the relationship of voltage and current in a pure inductive circuit
- Calculate values for inductors connected in series and parallel
- Define reactive power
- Define the Q of a coil

Element/course: **Resistive-Inductive Series Circuits (Year 2)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Define the relationship of resistance and inductance in an AC circuit
- Define power factor
- Calculate the values of voltage, current, apparent power, true power, reactive power, impedance, resistance, inductive reactance, and power factor in an RL series circuit
- Calculate the phase angle for current and voltage in an RL circuit
- Connect an RL series circuit and take measurements using test instruments

Element/course:	**Resistive-Inductive Parallel Circuits (Year 2)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Define the operation of a parallel circuit containing resistance and inductance
- Calculate the values of voltage, current, apparent power, true power, reactive power, impedance, resistance, inductive reactance, and power factor in an RL parallel circuit
- Connect an RL parallel circuit and measure circuit values using test instruments

Element/course:	***Capacitors (Year 2)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- List three factors that detriment the capacitance of a capacitor
- Discuss the electrostatic charge
- State the difference between polarized and non-polarized capacitors
- Calculate the values for series and parallel connections of capacitors

*Note that power factor correction is and always has been "green." That is why the studies concerning capacitance are so identified. Though the watts consumed do not change for a facility with, say, 80% power factor, the power company needs to deliver less total volt-amps if it is corrected.

Element/course:	***Capacitance in AC Circuits (Year 2)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Explain why current appears to flow through a capacitor when connected to an AC circuit
- Define capacitive reactance
- Calculate the value of capacitive reactance in an AC circuit
- Calculate the value of capacitance in an AC circuit
- Explain the relationship of voltage and resistance in an AC circuit

Element/course:	***Resistive-Capacitive Series Circuits (Year 2)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Explain the relationship of resistance and capacitance in an AC series circuit
- Calculate the values of voltage, current, apparent power, true power, reactive power, impedance, resistance, inductive reactance, and power factor in an RC series circuit
- Calculate the phase angle for current and voltage in an RC series circuit
- Connect an RC series circuit and make measurements using test instruments

Element/course:	***Resistive-Capacitive Parallel Circuits (Year 2)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Define the operation of a parallel circuit containing resistance and capacitance
- Calculate the values of voltage, current, apparent power, true power, reactive power, impedance, resistance, inductive reactance, and power factor in an RC parallel circuit
- Connect an RC parallel circuit and measure circuit values using test instruments

Element/course:	***Resistive-Inductive-Capacitive Series Circuits (Year 2)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Explain AC circuits that contain resistance, inductance, and capacitance connected in series
- Calculate the values of voltage, current, apparent power, true power, reactive power, impedance, resistance, inductive reactance, and power factor in an RLC series circuit

Element/course:	***Resistive-Inductive-Capacitive Parallel Circuits (Year 2)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Explain AC circuits that contain resistance, inductance, and capacitance connected in parallel
- Calculate the values of voltage, current, apparent power, true power, reactive power, impedance, resistance, inductive reactance, and power factor in an RLC parallel circuit

Element/course: **Three-Phase Circuits (Year 2)**	Planned Hours: 10

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Explain the difference between single-phase and three-phase voltages
- Draw a three-phase delta or wye connection
- Calculate the voltage and current values for wye and delta circuits

Element/course: **Single-Phase Transformers (Year 2)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Explain the difference between an isolation-transformer and an auto-transformer and how they work
- Calculate the values of voltage, current, and turns for a single-phase transformer
- Connect a transformer and test the voltage output of different windings
- Explain the polarity markings

Element/course: **Three-Phase Transformers (Year 2)** Note: Some of following objectives are closely related to the three-phase circuit subject matter already studied. Some of this is like a review and reinforcement	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Connect three single-phase transformers to form a three-phase bank
- Calculate voltage and current for three-phase transformer connections
- Connect two single phase transformers to form a three-phase open-delta connection
- Calculate the values of voltage and current for a three-phase transformer used to supply both three-phase and single-phase loads
- Define what a harmonic is.
- Discuss harmonic problems and their solution.

Element/course: **Three-phase Motors (Year 2)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Discuss the basis operating principals of a three-phase motor
- Explain a rotating magnetic field
- Discuss the operating principals of a squirrel-cage motor
- Connect dual voltage motors for correct operation on the desired voltage
- Reverse a three-phase motor by changing connections

Element/course: **Single-phase Motors (Year 2)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Reference the operation of various motor types
- Explain the basic operation of a split-phase motor
- Explain a starting winding and how it works
- Explain the operation of a centrifugal switch
- Recognize the types starting relays

Element/course: **Motor Load Calculations (Year 2)**	Planned Hours: 13

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Determine the full load current of any motor according to the NEC
- Size the branch circuit wire size for any motor
- Determine the appropriate circuit protection for any motor
- Use the motor name plate to size overloads
- Explain the difference between overload protection and short-circuit/ground-fault protection
- Size a feeder for any set of motors
- Size the feeder overcurrent device

Element/course: **Box Fill and Junction Box Sizing (Year 2)**	Planned Hours: 10

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Calculate box fill for any size wire and combination of devices
- Properly size pull and junction boxes

Element/course:	**Conductor Ampacity Correction Factors (Year 2)**	Planned Hours:	10

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Calculate correction factors for temperature
- Calculate correction for raceway fill
- Calculate correction factors for continuous loads
- Calculate correction factors for any combination of the above
- Properly use table 310.15(B)(16) and similar tables
- Properly apply NEC Chapter 9 notes for derate in nipples

Element/course:	**Raceway Fill (Year 2)**	Planned Hours:	10

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Use NEC tables to calculate raceway fill using any combination of wire sizes
- Properly use Annex C tables
- Properly fill conduit nipple

Element/course:	**Grounding and Bonding (Year 2)**	Planned Hours:	19

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Define objectionable current
- Define a main bonding jumper
- Properly size the grounding electrode conductor
- Properly install the grounding electrode system
- Explain the purpose of bonding
- Properly size equipment grounding conductors
- Use article 250 to properly ground and bond any system
- Effectively use the NEC to answer any grounding question

Element/course:	**Commercial Building Plans and Specifications (Year 3)**	Planned Hours:	8

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Review and discuss a review of basic safety rules for electrical systems
- Define the project requirements from the contract documents
- Demonstrate the application of building plans and specifications
- Locate specific information on building plans
- Obtain information from industry-related organizations
- Apply and interchange International System of Units (SI) and English measurements

Element/course:	**Reading Working Drawings (Year 3)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Read and interpret electrical symbols used in construction drawings
- Identify the electrical installation requirements for a building
- Determine elevations
- Determine the installation spaces of all other trades
- Determine construction materials, measurements, and specifications

Element/course:	**Calculating the Electrical Load (Year 3)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Determine the minimum lighting load for a given area
- Determine the receptacle load for a given area
- Determine Equipment loads
- Determine a reasonable calculated load
- Apply the factors for continuous loads
- Apply the factors for non-coincident loads

Element/course:	**Branch Circuits (Year 3)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Determine the required number of branch circuits for a set of loads
- Apply adjustment and correction factors
- Apply factors for continuous, motor, and heating loads
- Determine correct rating for branch circuit protective devices
- Determine appropriate wire type
- Determine the proper size
- Explain the heating effect of magnetic flux and how to properly wire to cancel it.

Element/course:	**Switches and Receptacles (Year 3)**	Planned Hours:	4

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Discuss the various NEMA configurations for receptacles
- Select the proper receptacle for use in hospitals, electronic equipment installations, and ground isolation
- Determine the proper use of switches based on rating and terminations
- Properly use color coding for electrical installations

Element/course:	**Cooking Equipment** (Based on Exam Prep) **(Year 3)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Calculate dwelling range loads of the same ratings
- Calculate dwelling range loads of different ratings
- Calculate demand loads for cooking equipment
- Calculate loads for commercial kitchen equipment
- Calculate loads for clothes dryers using the standard method
- Calculate loads for clothes dryers using the optional method
- Calculate neutral loads for cooking equipment and clothes dryers

Element/course:	**Commercial Calculations** (Based on Exam Prep) **(Year 3)**	Planned Hours:	10

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Calculate a commercial electrical service load using the standard calculation method of article 220
- Calculate a commercial electrical service load using the optional calculation method of article 220

Element/course:	**Wiring Methods** (Review and reinforcement from previous years) **(Year 3)**	Planned Hours:	4

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Select the proper raceway of cable for the conditions
- Identify the installation requirements for a raceway of cable
- Select the proper raceway size, depending on the conductors to be installed
- Properly size outlet, pull, and junction boxes

Element/course:	**Motor and Appliance Circuits** (Review and reinforcement from previous year) **(Year 3)**	Planned Hours:	10

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Use and interpret the word *appliance*
- Use and interpret the term *utilization equipment*
- Properly wire and properly install disconnecting means for appliances and motors
- Understand the term *Type 1* and *Type 2* protection
- Define *single phasing*
- Design a motor circuit: calculate proper wire size, overcurrent protection, overload size, disconnect size, feeder size for several motors, feeder overcurrent protection

Element/course: **Feeders (Year 3)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Calculate feeder loading
- Calculate the feeder overcurrent device
- Calculate the proper feeder size for any combination of loads
- Calculate correction factors
- Calculate voltage drop
- Calculate the reduced neutral size as is appropriate
- Determine raceway size

Element/course: **Special Systems (Year 3)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Select and install multi-outlet assemblies
- Calculate the load allowance for multi-outlet assemblies
- Select and install a floor outlet system
- Determine proper wiring for fire alarm installations

Element/course: **Working Drawings-Upper Level (Year 3)**	Planned Hours: 4

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Tabulate materials required to install an electrical rough-in
- Select the components to install large equipment such as commercial water heaters, heating, cooling, etc.
- Explain the advantages and disadvantages between single-phase and three-phase systems

Element/course: **Special Circuits (Year 3)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Describe typical connection schemes for photocells and timers
- Determine the requirements for wiring an elevator
- Properly connect the controls for a sump pump

Element/course: ***Lamps and Ballast for Lighting (Year 3)**	Planned 7 Hours:

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the technical terms for associated with lamps and ballast
- Identify lamps scheduled to be used in a commercial building
- Understand the basics of incandescent, halogen, fluorescent, LED, and HID lamps
- Understand the practical application of lamps used in a commercial building
- Understand more about energy savings for lamps and ballasts
- Identify lamp types according to characteristics and letter designations
- Be aware of the hazards of disposing lamps and ballasts

Element/course: ***Luminaires (Year 3)**	Planned 4 Hours:

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Locate luminaires in a space
- Properly select and install luminaires
- Discuss the attributes of different types of luminaires
- Exercise some control over energy savings by giving proper advice

Element/course: **Overcurrent Protection: Fuses and Circuit Breakers (Year 3)**	Planned 7 Hours:

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- List and identify the types, classes, and ratings of fuses and circuit breakers
- Describe the operation of fuses and circuit breakers
- Develop an understanding of switch sizes, ratings, and requirements
- Define *interrupting rating, short-circuit currents, RMS, and current limitation*
- Use let-through charts

Element/course: **Short-Circuit Calculations and Coordination of Overcurrent Protective Devices (Year 3)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Perform Short-circuit calculations using the point-to-point method
- Calculate short-circuit currents using the appropriate tables and charts
- Define the terms *coordination, selective systems, and non-selective systems*

Element/course: ***Commercial Utility Interactive Photovoltaic Systems (Year 3)**	Planned Hours: 7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- List the components of a utility interactive solar photovoltaic system
- Describe the function of a utility interactive solar photovoltaic system and components
- Apply the NEC to the design and installation of commercial utility interactive solar photovoltaic system and components
- Interpret a typical utility interactive solar photovoltaic system single line drawing

Element/course: **Basic Principles of Motor Controls (Year 3)**	Planned Hours: 10

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Recognize ladder diagrams
- Recognize connection diagrams
- Recognize pictorial diagrams
- Use and interpret definitions, abbreviations, and graphic symbols used on motor control diagrams
- Describe the function of pushbutton stations, solenoids, flow switches, pressure switches, limit switches, and timing relays

Element/course:	**Components of Control Circuit Schematics, Magnetic Control (Year 3)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Use a ladder diagram to illustrate a simple two wire control circuit for a single-phase motor operated by a float switch or similar device
- Use a ladder diagram to illustrate a simple start/stop station operating a motor starter
- Identify circuit types classified by power source—common control circuits, transformer control wiring, and separate control wiring
- Identify control devices and their function
- Identify remote-control circuits and their function
- Use 120 volt control circuit to operate a 480 volt load
- Explain the operation and use of magnetic motor starters

Element/course:	**Basic Control Circuits, Overcurrent Protection for Control Circuits (Year 3)**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Design both two-wire and three-wire controls using start/stop stations and other devices such as float switches
- Design a circuit operating a motor starter using two or more start/stop stations
- Use the NEC to properly protect control circuits to include conductor sizes, overcurrent protection, and control transformers

Element/course:	**Indicator Lights and Illuminated Pushbuttons, Selector Switch Truth Tables (Year 3)**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the use of illumination in motor controls
- Interpret symbols used on diagrams
- Read truth tables
- Diagram the use of a selector switch on a three-wire control for a jogging application

Element/course:	**Reversing Controls for Three-Phase Motors, Reversing Controls with Indicator Lights for Three-Phase Motors, Reversing Controls with Limit Switches for Three-Phase Motors, Reversing Single Phase Motors (Year 3)**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Diagram the operation of a reversing starter
- Diagram the operation of a reversing control station
- Diagram the operation of a reversing control selector switch
- Apply functional indicator lights to reversing controls
- Diagram a limit switch to automatically stop a motor
- Diagram reversing operations using limit switches
- Diagram the operation of a garage door
- Diagram the operation of reversing a single-phase motor

Element/course:	**Sequencing Control and Master Stop Function, Introduction to Variable Frequency Drives – (Year 3)**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Interpret a diagram showing the sequencing of several motors
- Apply the master stop function to and process using motor controls
- Explain the basic operation of variable frequency drives

Element/course:	**Panelboard selection and Installation (Year 3)**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Identify the criteria for selecting a panelboard
- Correctly place and number circuits in a panelboard
- Calculate the proper feeder size for a panelboard
- Determine the correct overcurrent protection for a panelboard
- Prepare a panelboard directory

Element/course: **The Electric Service (Year 3)**	Planned Hours: 6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Install power transformers to meet NEC requirements
- Draw the basic transformer connection diagram
- Recognize different service types
- Define the various components of service equipment
- Correctly install service equipment
- Connect metering equipment
- Install the grounding system

Element/course: **Low Voltage Remote-Control (Year 3)**	Planned Hours: 3

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Discuss the importance of energy savings and ways to accomplish it.
- List the components of a low-voltage remote-control wiring system
- Select the appropriate NEC sections governing the installation of a low-voltage remote-control wiring system
- Demonstrate the correct connections for wiring a low-voltage remote-control system

Element/course:	**Cooling Systems (Year 3)**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- List the parts of a cooling system
- Describe the function of each part in a cooling system
- Calculate the sizes of the electrical components
- Read a typical wiring diagram that shows the operation of a cooling unit

Element/course:	**Hazardous Locations: NEC Articles 500 through 504 (Year 4)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine proper wiring of a Class I, Division 1 locations
- Determine proper wiring of a Class I, Division 2 locations
- Determine proper wiring of a Class II, Division 1 locations
- Determine proper wiring of a Class II, Division 2 locations
- Determine proper wiring of a Class III, Division 1 locations
- Determine proper wiring of a Class III, Division 2 locations
- Determine proper wiring of Commercial Garages
- Determine proper wiring of Motor Fuel Dispensing Facilities

Element/course:	**Commercial Garages, Motor Fuel Dispensing Facilities: NEC Articles 511 and 514 (Year 4)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Define a major repair garage
- Define a minor repair garage
- Properly classify hazardous areas
- Use the NEC to properly wire a commercial garage of any type
- Define a Motor Fuel Dispensing Facility
- Use the NEC to properly wire Motor Fuel Dispensing Facilities

Element/course:	**Health Care Facilities, Assembly Occupancies, Carnivals, Fairs and Similar Events: NEC Articles 517 through 525 (Year 4)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Use the NEC to properly define a health care facility type
- Define General Care Areas and Critical Care Areas
- Discuss Essential Electrical Systems
- Properly wire and ground a health care facility
- Discuss the proper wiring methods for places of assembly
- Discuss the proper wiring of carnivals, fairs, and similar events

Element/course:	**Agricultural Buildings, Marinas and Boatyards, Temporary Installations: NEC Articles 547 through 590 (Year 4)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Determine the proper wiring for any agricultural building
- Properly calculate farm loads using the NEC
- Determine marina requirements using the NEC
- Determine and discuss the requirements for temporary installations

Element/course:	**Electric Signs and Outline Lighting, Manufactured Wiring Systems, Elevators, Escalators, and Moving Walks: NEC Articles 600 through 620 (Year 4)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine proper installation and requirements of electric signs and associated lighting
- Compare manufactured wiring systems instructions against Article 604 or 605 as is appropriate
- Determine proper installation and requirements of elevators, escalators, and moving walks

Element/course:	**Audio Signal Processing, Amplification, Reproduction Equipment, and Information Technology Equipment: NEC Articles 640 and 645 (Year 4)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Apply the goal of reducing the spread of fire and smoke in case of a fire
- Comply with other articles when installing audio equipment
- Reduce shock hazards peculiar to audio equipment
- Determine proper installations in IT rooms

Element/course:	**Swimming Pools, Spas, Hot Tubs, Fountains, and Similar Locations: NEC Article 680 (Year 4)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine proper electrical installations for swimming pools
- Determine proper electrical installations for spas and hot tubs
- Determine proper electrical installations for fountains

Element/course:	**Emergency Standby Power Systems, Legally Required Power Systems, Optional Standby Power Systems: NEC Articles 700 through 702 (Year 4)**	Planned Hours:	4

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine the proper installation of systems deemed essential to protect human life
- Determine the difference between *emergency* stand by, *legally required* standby, and *optional standby* power systems

Element/course:	**Remote-Control, Signaling, and Power-Limited Circuits: NEC Article 725 (Year 4)**	Planned Hours:	4

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Define a class 1 circuit
- Define a class 2 circuit
- Define a class 3 circuit
- Determine proper installation and requirements class 1, class 2, and class 3 circuits

Element/course:	**Fire Alarm Systems: NEC Article 760 (Year 4)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Define nonpower-limited fire alarm circuits
- Define power-limited fire alarm circuits
- Determine the proper installation of fire alarm wiring using the NEC
- Determine where the use of GFCI and AFCI are restricted
- Determine environmental air space

Element/course:	**Optical Fiber Cables and Raceways, Communications Systems: NEC Articles 770 and 800 through 820 (Year 4)**	Planned Hours:	4

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine proper installation of optical fiber cables
- Properly fire-stop penetrations
- Determine proper grounding of communications wiring and equipment
- Determine proper installations of communication wiring

Element/course:	**Requirement for Electrical Installations: NEC Article 110 (Year 4)**	Planned Hours:	4

Mode of Instruction (please check all that apply):
Classroom x Lab x On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine the proper termination of conductors
- Determine the kinds of warnings, markings, and identification a given installation requires
- Determine the proper working clearance for any installation
- Determine proper voltage rating
- Determine proper AIC rating

Element/course:	**Use and Identification of Grounded Conductors, Branch Circuits, Feeders: NEC Articles 200, 210 and 215 (Year 4)**	Planned Hours:	4

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Properly identify a grounded conductor
- Properly apply the general provisions of Article 210
- Properly apply the branch circuits ratings of Article 210
- Properly install the required outlets of Article 210
- Calculate the minimum size and ampacity of any feeder

Element/course:	**Branch Circuit, Feeder, and Service Calculations (review from previous years): NEC Article 220 (Year 4)**	Planned Hours:	13

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Demonstrate the ability to calculate the loads for a single-family dwelling
- Demonstrate the ability to calculate the loads for a multifamily dwelling
- Demonstrate the ability to calculate the loads for a commercial or industrial installation

Element/course:	**Outside Branch Circuits and Feeders, Services (review from previous years): NEC Articles 225 and 230 (Year 4)**	Planned Hours:	4

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Properly install conductors and lighting installed outdoors
- Determine vertical and horizontal clearance of overhead conductors
- Determine proper disconnecting means and installation
- Determine the proper installation and protection of “line” and “load” conductors

Element/course:	**Overcurrent Protection (critical review from previous years): NEC Article 240 (Year 4)**	Planned Hours:	7

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Properly size a standard overcurrent device to any conductor
- Properly apply the small conductor rules
- Calculate transformer secondary conductor protection
- Reference requirements for appliance protection
- Calculate tap conductor protection
- Reference protection for motors and air conditioners

Element/course:	**Grounding and Bonding (critical review from previous years): NEC Article 250 (Year 4)**	Planned Hours:	13

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Define the difference between grounding and bonding
- Determine the proper grounding and bonding requirements of any system
- Properly size the main bonding jumper
- Properly size the grounding electrode conductor
- Properly size equipment grounding conductors
- Determine the various types of a grounding conductors
- Design a proper grounding electrode system

Element/course:	**Surge Protective Devices: NEC Article 285 (Year 4)**	Planned Hours:	3

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to:

- Understand the applicable components of Electrical Safety
- Determine the installation requirements SPD's
- Discuss the difference between Type 1, Type 2, and Type 3 SPD's and their use

Element/course:	**Wiring Methods, Conductors for General Wiring: NEC Articles 300 and 310 (Year 4)**	Planned Hours:	13

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine how to route, splice, protect, and secure conductors and raceways
- Determine the general requirements for conductors such as insulation markings, ampacity ratings, and conductors to use in specific installations
- Properly use the Article 310 tables
- Apply Chapter 9 tables
- Properly derate any conductor based on wire fill, temperature, and continuous load
- Define the meaning of conductor insulation lettering
- Discuss the effects of nonlinear loads on multiwire branch circuit and feeder neutral conductors and if a neutral conductor is to be counted as current carrying.

Element/course:	**Cabinets, Cutout Boxes, and Meter Socket Enclosures; Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Handhole Enclosures: NEC Articles 312 and 314 (Year 4)**	Planned Hours:	10

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine the use of any enclosure based on the conditions of use
- Determine the installation requirements for any enclosure
- Properly use boxes and fittings based on internal volume
- Determine the requirements for fill of boxes and fittings
- Properly size pull and junction boxes for No. 4 AWG conductors and larger

Element/course:	**Armored Cable, Metal Clad Cable, Nonmetallic-Sheathed Cable, Service-Entrance Cable, Underground Feeder and Branch-Circuit Cable (Type UF): NEC Articles 320, 330, 334, 338, and 340 (Year 4)**	Planned Hours:	3

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine the installation requirements of Armored Cable
- Determine the installation requirements of Metal-Clad Cable
- Determine the installation requirements of Nonmetallic-Sheathed Cable
- Determine the installation requirements of Service-Entrance Cable
- Determine the installation requirements of Underground Feeder and Branch-Circuit Cable (Type UF)
- Relate temperature concerns, derating, etc. to other appropriate articles in the NEC

Element/course:	**Intermediate Metal Conduit, Ridged Metal Conduit, Flexible Metal Conduit, Liquidtight Flexible Metal Conduit: NEC Articles 342, 344, 348, and 350 (Year 4)**	Planned Hours:	3

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine the installation requirements of Intermediate Metal conduit
- Determine the installation requirements of Ridged Metal Conduit
- Determine the installation requirements of Flexible Metal Conduit
- Determine the installation requirements of Liquidtight Flexible Metal Conduit
- Relate conductor fill, derating, etc. to other appropriate articles in the NEC

Element/course:	**Ridged Polyvinyl Chloride Conduit, Liquidtight Flexible Nonmetallic Conduit, Electrical Metallic Tubing, Electrical Nonmetallic Tubing: NEC Articles 352, 356, 358, and 362 (Year 4)**	Planned Hours:	3

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine the installation requirements of Ridged Polyvinyl Chloride Conduit
- Determine the installation requirements of Liquid-tight Flexible Nonmetallic Conduit
- Determine the installation requirements of Electrical Metallic Tubing
- Determine the installation requirements of Electrical Nonmetallic Tubing
- Relate conductor fill, derating, etc. to other appropriate articles in the NEC

Element/course:	**Metal Wireways, Multioutlet Assemblies, Surface Metal Raceways, Cable Trays: NEC Articles 376, 380, 386, 392 (Year 4)**	Planned Hours:	3

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine the proper installation of a metal wireway
- Calculate the proper conductor fill of a metal wireway
- Calculate the proper size of a metal wireway based on conductor size and conduit entries
- Properly splice conductors in a metal wireway
- Determine the proper installation of multioutlet assemblies
- Determine the proper installation of surface metal raceways
- Determine the proper installation and use of cable trays

Element/course:	**Flexible Cords and Flexible Cables, Fixture Wires, Switches, Receptacles, Cord Connectors, and Attachment Plugs: NEC Articles 400, 402, 404, and 406 (Year 4)**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Identify requirements, applications, and construction specifications of cords and cables
- Select cords, cables, and fittings listed for specific applications
- Identify requirements and specifications of fixture wires
- Determine types and uses of switches
- Mount receptacles according to the details of 406.4 (A) through (G)
- Following the grounding requirements of the specific device being used

Element/course:	**Switchboards and Panelboards, Luminaires, Lampholders, and Lamps: NEC Articles 408 and 410 (Year 4)**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine the specific requirements for switchboards, panelboards, and distribution boards that control power and lighting circuits
- Properly identify the use of each circuit in a panelboard or switchboard
- Properly terminate conductors in panelboards and switchboards
- Determine the general requirements of Part I of Art. 410
- Determine the location requirements of Part II of Art. 410
- Determine the box and covers requirements of Part III of Art. 410
- Determine the support requirements of Part IV of Art. 410
- Determine the grounding requirements of Part V of Art. 410
- Determine the wiring requirements of Part VI of Art. 410

Element/course:	**Lighting Systems Operating at 30 Volts or Less: NEC Article 411 (Year 4)**	Planned Hours:	3

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Explain the potential for fire in low voltage lighting systems because of currents as high as 25 amps
- Explain the need for an isolation transformer
- Discuss the proper wiring method for low voltage lighting

Element/course:	**Appliances, Fixed Electric Space Heating Equipment: NEC Articles 422 and 424 (Year 4)**	Planned Hours:	6

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Calculate and determine proper branch circuit ratings for any appliance
- Calculate and determine proper overcurrent protection for any appliance
- Determine the requirements for nonmotor appliances
- Explain article 430 compliance for motor operated appliances
- Explain article 440 compliance for appliances containing hermetic compressors
- Determine proper disconnecting means
- Determine requirements for heating installations using Article 424, Part I through Part VI
- Understand the content of Article 424, Part VII through IX

Element/course:	**Motors, Motor Circuits, and Controllers; Air-conditioning and Refrigeration Equipment, NEC Articles 430 and 440 (review from previous years) (Year 4)**	Planned Hours:	12

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
At the completion of this lesson the student should be able to use the NEC to:

- Understand the applicable components of Electrical Safety
- Determine the proper conductor size for any motor
- Determine the proper overcurrent protection for any motor
- Explain why the apparent over-fusing of conductors according to table 430.52 is both safe and necessary
- Determine the proper disconnect for any motor
- Determine the proper overload protection for any motor and condition (easy start, hard start, etc.)
- Determine the minimum size feeder for a group of motors
- Determine the feeder overcurrent protection
- Properly size circuits and overcurrent devices for air conditioning and refrigeration equipment

Element/course: Lewis Clark State College	Basic Trainee Classes, Provided by: "Authorized Providers" WAC 296-46B-970 2.(B) (i), Continuing education and classroom education requirements.	Planned Hours:	96

Mode of Instruction (please check all that apply):
Classroom x Lab On-line Self-study
Provided by: Lewis-Clark State College

Description of element/course:
Electrical trainees must take certain basic trainee classroom instruction courses to maintain their training certificate. See list of courses,
http://www.lni.wa.gov/TradesLicensing/Electrical/files/edclass/BasicTraineeClassroomEducation.pdf