Idaho Electrical Apprenticeship Annual Related Instruction Courses

1. General Electrical Safety: Students will be able to					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Explain what a material safety data sheet (MSDS/SDS) is and its requirements.	7	47	24	2.22	78
Explain safety procedures for trenches.	8	26	43	2.45	77
Explain safety for confined space.	7	28	41	2.45	76
Explain lockout and tagout.	1	11	65	2.83	77
Explain protective clothing to include eye and hearing protection.	3	28	46	2.56	77
Explain the use of a safety harness.	3	29	45	2.55	77
Explain safety for ladders and scaffolds.	4	24	48	2.58	76
State the purpose of arc-fault and ground-fault circuit interrupters.	6	39	31	2.33	76
Identify safe handling and use of hand and power tools.	4	32	41	2.48	77
				answered question	78
				skipped question	0

2. ELECTRICAL THEORY: Students will be able to					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Understand Electrical Qualities, and Ohm's Law to determine the resistance of a resistor using the color code or ohmmeter; determine whether a resistor is operating within its power rating; select the proper formula for calculating electrical values.	26	38	13	1.83	77
Understand Static Electricity and Magnetism as it relates to static electricity, lightening protection, static charges, and to determine the polarity of an electromagnet when the direction of the current is known.	34	38	5	1.62	77
				answered question	77
				skipped question	1

3. ELECTRICAL CIRCUITS: Students will be able to					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Understand Series Circuits to calculate values for voltage, current, resistance, and power for series circuits.	20	37	20	2.00	77
Understand Parallel Circuits to solve for missing values in a parallel circuit and calculate current values.	20	37	20	2.00	77
Solve Combination Circuits using Ohm's Law and the rules for parallel and series circuits.	23	38	16	1.91	77
				answered question	77
				skipped question	1

4. TOOLS: Students will be able to					
Answer Options	Nice to Know	Need to Know	Critical to Know	Rating Average	Response Count
Use Electrical Testing Equipment to measure resistance, measure voltage between phases and phase to ground; take an ampere reading of any load, diagram the proper connection of a watt meter, and recognize a wave form.	9	24	44	2.45	77
Understand Bending Conduit and identify methods, tools, and bends required in bending raceways.	6	38	33	2.35	77
				answered question	77
				skipped question	1

5. INTRODUCTION TO THE NATIONAL ELECTRICAL CODE (NEC): Students will use and interpret					
Answer Options	Nice to Know	Need to Know	Critical to Know	Rating Average	Response Count
General Requirements: NEC Articles 90, 100, and 110.	12	44	21	2.12	77
Boxes and Enclosures: NEC Articles 312, 314, and other appropriate NEC sections.	11	50	16	2.06	77
Cables: NEC Articles 320 through 340, and other appropriate NEC sections.	14	47	16	2.03	77
Raceways and Conductors: NEC Sections 110.14, 240.4, 300.19; NEC Articles 310, 342 through 378; Chapter 9 Tables; Annex C, and other appropriate NEC Sections.	10	46	21	2.14	77
General Provisions for One-Family Dwellings: NEC Articles 210, 220, 240, 250, 315, 402, 404, 406, 410, 422, and other appropriate NEC Sections.	30	39	8	1.71	77
Specific Provisions for One-Family Dwellings: NEC Articles 210, 410, 422, and other appropriate NEC sections.	31	37	9	1.71	77
Load Calculations for One-Family Dwellings: NEC Articles, 210, 220, 230, 250, 310, and other appropriate NEC sections.	36	31	11	1.68	78
Services and Electrical Equipment for One-Family Dwellings: NEC Articles 110, 225, 230, 240, 250, 300, 310, and other appropriate NEC sections.	27	41	9	1.77	77
Comprehensive Provisions for Multi-Family Dwellings: NEC Articles 210, 230, 240, 250, 310, Chapter 9, Tables 8 and 9, and other appropriate NEC sections.	36	30	10	1.66	76
Commercial Locations--General Provisions: NEC Articles 210, 220, 310, 410, 430, 440, 600, and other appropriate NEC sections.	25	42	9	1.79	76
Commercial Locations--Services, Feeders, and Provisions: NEC Articles 110, 215, 230, 250, 368, 408, and other appropriate NEC sections.	26	39	11	1.80	76
				answered question	78
				skipped question	0

6. SPECIAL OCCUPANCIES: Student will use and interpret					
Answer Options	Nice to Know	Need to Know	Critical to Know	Rating Average	Response Count
Hazardous Locations: NEC Articles 500 through 516.	31	36	9	1.71	76
Health Care: NEC Article 517.	32	39	5	1.64	76
Other Special Occupancies: NEC Articles 518 through 551.	37	36	3	1.55	76
				answered question	76
				skipped question	2

7. Are there other student learning outcomes that should be included during this year of related instruction?	
Answer Options	Response Count
	13
1- NFPA70E Arc Flash Training, Osha10 training would cover most of the safety training listed above.	
2- Need to explain to students what equipment they expect to find in either residential, commercial or industrial facilities. Also include approximatepay associated with each field. I do not think that students these days know what is out there, especially when related to industrial facilities. We are required to obtain a journeyman license in Idaho, so they should be teaching more code as that is the only test that really matters to get a license.	
3- Be able to read a basic set of prints. At the least be able to identify electrical symbols.	
4- Variety is more important than mastery in an apprentice. Broad scope is the best foundation for future competence.	
5- First aid, CPR	
6- Teach students about work ethics and how to work.	
7- photovoltaic systems and lighting control systems.	
8- At this point in an apprentices instruction they should know how to identify and use tools safely. Have the ability to work safely on different job sites. They should become familiar with equipment, materials and the different types of installations and uses of electrical equipment.	
9- Basic hand tools,and power tools used. Common materials used and trade sizes. Teach them how to read a tape measure. Understanding Residential foundations and framing would be nice as well.	
10- OSHA training.	
11- being able to understand what is wanted and what is needed.	
12- TROUBLESHOOTING BASICS FOR BRANCH CIRCUITS AND GFCI/ AFCI FUNCTIONALITY.	
13- 10 Hour OSHA course for construction should be a minimum requirement for 1st year.	
answered question	13
skipped question	65

8. ELECTRICAL MATHEMATICS: Students will be able to					
Answer Options	Nice to Know	Need to Know	Critical to Know	Rating Average	Response Count
Apply Basic Trigonometry to solve problems for electrical circuits and conduit bending by using the Pythagorean Theorem, sines, cosines, and tangents.	17	46	10	1.90	73
				answered question	73
				skipped question	5

9. ALTERNATING CURRENT THEORY: Students will be able to					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Circuits--Calculate values for AC and DC circuits.	9	51	13	2.05	73
Three-Phase Circuits--Calculate voltage and current values for wye and delta circuits.	8	47	17	2.13	72
Single-Phase Transformers--Calculate voltage, current, and turns.	19	38	16	1.96	73
Three-Phase Transformers--Calculate the voltage and current for connections and to supply both three-phase and single-phase loads.	17	39	16	1.99	72
				answered question	73
				skipped question	5

10. MOTORS: Students will be able to					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Understand operating principals of three-phase and squirrel-cage motors, connect dual voltage motors and reverse a three-phase motor.	15	45	13	1.97	73
Understand the operation of different single-phase motor types, purpose of centrifugal switch and a start winding, and recognize the types of starting relays.	19	45	9	1.86	73
Perform motor load calculations as per NEC.	13	40	19	2.08	72
				answered question	73
				skipped question	5

11. NEC COMPLIANCE: Students will be able to use the NEC to comply with requirements for					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Box Fill and Junction Box Sizing.	1	41	31	2.41	73
Conductor Ampacity Correction Factors.	1	35	37	2.49	73
Raceway Fill.	1	37	34	2.46	72
Grounding and Bonding.	2	27	44	2.58	73
				answered question	73
				skipped question	5

12. Are there other student learning outcomes that should be included during this year of related instruction?	
Answer Options	**Response Count**
	6
1- Reading Plans and understanding them.	
2- Anything code related.	
3- This is where service and feeder calcs should START.	
4- They should be learning basic electrical circuits used in the electrical industry. They should also become familiar with different wiring methods and the specific codes related to them.	
5- Blue Print Reading.	
6- Blueprint reading. NFPA 70E standard for electrical workplace safety and creating a safe work culture.	
answered question	6
skipped question	72

13. GENERAL ELECTRICAL SAFETY: Students will be able to					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Apply NFPA70E to achieve an electrically safe work condition.	2	22	47	2.63	71
				answered question	71
				skipped question	7

14. BLUEPRINTS: Students will be able to					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Apply Fundamental Print Reading Skills.	3	34	34	2.44	71
Read and Interpret Residential and Commercial Electrical Symbols.	3	37	31	2.39	71
Identify and Use the Proper Electrical Drawings and Plans for the Application.	3	39	29	2.37	71
Describe the Construction and Maintenance Process.	14	43	14	2.00	71
Use Plans and Drawings for Residential and Commercial Power and Lighting Systems.	5	35	31	2.37	71
				answered question	71
				skipped question	7

15. LOAD CALCULATIONS: Students will be able to					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Determine Single Family Dwelling Unit Electrical Calculations,	11	49	11	2.00	71
Determine Multifamily Dwelling Electrical Calculations,	16	45	10	1.92	71
Determine Commercial Electrical Calculations,	14	46	11	1.96	71
				answered question	71
				skipped question	7

16. CONDUCTOR CALCULATIONS: Students will be able to					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Perform Raceway and Box Calculations according to NEC rules,	0	38	33	2.46	71
Perform Conductor Sizing and Protection Calculations according to NEC rules,	0	30	41	2.58	71
Determine Voltage Drop Calculations according NEC rules,	3	39	29	2.37	71
Apply Article 430 of the NEC in regards to motors,	7	41	22	2.21	70
Apply Article 450 of the NEC in regards to transformers,	10	40	21	2.15	71
				answered question	71
				skipped question	7

17. MOTOR CONTROLS: Students will be able to					
Answer Options	Nice to Know	Need to Know	Critical to Know	Rating Average	Response Count
Explain the Basic Principles of Motor Controls and use and interpret diagrams,	7	49	15	2.11	71
Understand Components of Magnetic Control Circuits to design controls and circuits using start/stop stations,	11	46	14	2.04	71
Use NEC to Apply Overcurrent Protection for Control Circuits,	7	40	24	2.24	71
Understand the Use of Indicator Lights, Illuminated Pushbuttons, and Selector Switch Truth Tables, including interpreting symbols on diagrams and reading truth tables.	18	46	7	1.85	71
Understand Reversing Motor Controls, including the operation of a reversing starter with interlocks, a reversing control station, a reversing control selector switch, reversing a single-phase motor, and reversing operations using limit switches.	16	45	10	1.92	71
Understand Sequencing Control and Master Stop Function, including interpreting diagrams and applying the master stop function to a process using motor controls.	18	40	12	1.91	70
Use and Interpret Electrical and Electronic Diagrams.	8	44	19	2.15	71
Understand Industrial Control Systems, including the numbering system used in control circuit diagrams, device arrangements to form logic functions, and the purpose of each logic function.	23	41	7	1.77	71
				answered question	71
				skipped question	7

18. Are there other student learning outcomes that should be included during this year of related instruction?	
Answer Options	Response Count
	5
1- Basic operational theory and installation practices for VFD's.	
2- Should start becoming familiar with PLC by now.	
3- PLC's and electronic motor controllers such as softstarts and VFD's.	
4- need to state blue print reading and understanding early in the program.	
5- Information from first two years not deemed critical for those years gets progressively more critical this year.	
answered question	5
skipped question	73

19. GENERAL NEC REQUIREMENTS: Students will be able to interpret and apply the requirements of the following NEC					
Answer Options	Nice to Know	Need to Know	Critical to Know	Rating Average	Response Count
Electrical Installation Requirements: Articles 90, 100, and 110.	4	33	33	2.41	70
				answered question	70
				skipped question	8

20. WIRING AND PROTECTION: Students will be able to interpret and apply the requirements of the following NEC					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Use and Identification of Grounded Conductors, Branch Circuits, and Feeders: Articles 200, 210 and 215 .	1	27	42	2.59	70
Branch Circuit, Feeder, and Service Calculations: Article 220.	3	30	37	2.49	70
Outside Branch Circuits and Feeders, Services: Articles 225 and 230.	4	30	36	2.46	70
Overcurrent Protection: Article 240.	2	25	43	2.59	70
Grounding and Bonding: Article 250.	1	21	48	2.67	70
Surge Protective Devices: Article 285	15	40	14	1.99	69
				answered question	70
				skipped question	8

21. WIRING METHODS AND MATERIALS: Students will be able to interpret and apply the requirements of the following					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Wiring Methods and Conductors for General Wiring: Articles 300 and 310.	2	30	38	2.51	70
Enclosures: Articles 312 and 314.	8	32	30	2.31	70
Cables: Articles 320, 330, 334, 338, and 340.	7	37	26	2.27	70
Metal Raceways: Articles 342, 344, 348, 350, 352, 356, 358, and 362.	4	37	29	2.36	70
Metal Wireways, Multioutlet Assemblies, Surface Metal Raceways, Cable Trays: Articles 376, 380, 386, 392.	12	39	19	2.10	70
				answered question	70
				skipped question	8

22. EQUIPMENT FOR GENERAL USE: Students will be able to interpret and apply the requirements of the following NEC					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Flexible Cords, Flexible Cables, and Fixture Wires: Articles 400 and 402.	9	43	18	2.13	70
Switches, Receptacles, Cord Connectors, and Attachment Plugs: Articles 404 and 406.	5	37	28	2.33	70
Switchboards, Switchgear, and Panelboards: Article 408.	5	35	30	2.36	70
Luminaires, Lampholders, and Lamps: Article 410.	7	39	24	2.24	70
Lighting Systems Operating at 30 Volts or Less: Article 411.	20	37	13	1.90	70
Appliances, Fixed Electric Space Heating Equipment: Articles 422 and 424,	13	42	14	2.01	69
Motors, Motor Circuits, and Controllers; Air-conditioning and Refrigeration Equipment: Articles 430 and 440.	8	44	18	2.14	70
				answered question	70
				skipped question	8

23. SPECIAL OCCUPANCIES: Students will be able to interpret and apply the requirements of the following NEC Articles					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Hazardous Locations: Articles 500 through 506.	11	48	11	2.00	70
Commercial Garages, Motor Fuel Dispensing Facilities: Articles 511 and 514.	16	44	10	1.91	70
Health Care Facilities: Article 517.	11	46	11	2.00	68
Assembly Occupancies, Carnivals, Fairs and Similar Events: Articles 518 through 525.	23	40	7	1.77	70
Agricultural Buildings: Article 547.	21	39	10	1.84	70
Temporary Installations: Article 590.	10	45	15	2.07	70
				answered question	70
				skipped question	8

24. SPECIAL CONDITIONS: Students will be able to interpret and apply the requirements of the following NEC Articles					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Emergency Systems, Legally Required Standby Systems, Optional Standby Systems: Articles 700 through 702.	16	44	10	1.91	70
Remote-Control, Signaling, and Power-Limited Circuits: Article 725.	26	36	8	1.74	70
Fire Alarm Systems: Article 760.	17	37	15	1.97	69
				answered question	70
				skipped question	8

25. COMMUNICATION SYSTEMS: Students will be able to interpret and apply the requirements of the following NEC					
Answer Options	**Nice to Know**	**Need to Know**	**Critical to Know**	**Rating Average**	**Response Count**
Optical Fiber Cables and Raceways; Communications Systems: Articles 770 and 800 through 820.	37	29	4	1.53	70
				answered question	70
				skipped question	8

26. Are there other student learning outcomes that should be included during this year of related instruction?	
Answer Options	**Response Count**
	6
1- Basic instrumentation and controls, including PLC's and pressure, temperature, flow, control valve operations.	
2- Would like to see more PLC and Programming throughout the whole apprenticeship. The electrical industry is leaning towards that. Especially the industrial electrician.	
3- So we have a 5 year program are you going to address the training needs for the 5th year ?	
4- State Statutes & Regulations; Exam Preparation.	
5- Students need to understand bid documents and how those bid documents dictate/affect the project they are building. Understanding addenda, allowances and alternates as well as unit prices is very helpful.	
6- Items deemed less critical in years 1-3 become critical in the 4th year.	
answered question	6
skipped question	72