

PROGRAM COMPETENCY PROFILE FOR CAREER TECHNICAL EDUCATION
Career Cluster: Architecture and Construction

Program Name: Electrician CIP: 460302

Effective 6/2012

National Standard: National Fire Protection Association – 70: National Electric Code

Competencies (statement that provides the overview and defines the instructional area) Student will:	Knowledge, Content and Skills (what a student needs to know and be able to do and upon which they will be assessed) Student will:	<u>NH Common Core State Standards – Aligned</u> <ul style="list-style-type: none"> • English/Language Arts/Literacy: E • Mathematics: M • Science: S • Art: A 	Rating Scale -Sample Performance Assessments (Performance tasks the student needs to demonstrate in order to be rated proficient in meeting the competency) Student will:				
Understand safe workplace practices, use of tools, materials, and equipment, and codes and regulations of the trade in order to foster a safe work environment.	1. Identify and follow necessary safety precautions with operations and materials according to federal, state, and local regulations (normal/hazardous). AAI 8. Health, Safety, and Environment: Explain the health and safety laws and practices affecting the employee, the surrounding community, and the environment in this industry.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As a new employee at Rogers company you are required to complete the safety training required by the company by viewing the video and completing assessment.	1	2	3	4
	1	2	3	4			
2. Discuss and explain NO LIVE WORK in accordance with sections in 70-E and OSHA by demonstrating Lockout-Tagout process.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As an apprentice you will receive 70-E training from the employer. You will need to demonstrate competency in the field.	1	2	3	4	
1	2	3	4				
Understand the concepts and procedures in the use the four categories and other types of meters in order to provide safe and accurate electrical measurements.	3. Identify the different categories and types of meters and demonstrate appropriate use.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: As an apprentice you will troubleshoot an electrical failure using the appropriate meter.	1	2	3	4
1	2	3	4				

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Understand the concepts, theory, and basic principles in order to solve Ohm’s law and equations for circuits.	4. Discuss and explain the fundamental concepts and theory.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> As an apprentice, on the job your supervisor has asked you to calculate a lighting load for a specific circuit. Cont. to #6.	1	2	3	4
1	2	3	4				
	5. Solve problems for an unknown voltage, an unknown amperage, an unknown resistance, and an unknown wattage.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
Understand and use manufacturer’s designations in conductor and cable specifications, use, and installation in order to install new circuits and extend existing circuits.	6. Calculate the voltage, amperes and resistance of a series circuit and of a parallel circuit. AAI 5. Underlying Principles of Technology: Explain through discussion the technological systems used within this industry. 7. Match letter type designations for conductors to their correct description and identify use.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> As an apprentice your employer requires you to choose and install the appropriate wiring method for a given residential installation. Cont. to #11.	1	2	3	4
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	8. List types of cables commonly found in residential/commercial wiring.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	9. Install cable in open stud work during new construction. AAI 4. Technical and Production Skills: Identify specific production and technical skills required for this industry.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	10. Install cable from main panel to new outlets and install cable between an existing box and a new box.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	11. Recognize wiring techniques required for old work through attic or basement space considering NFPA70E.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
Understand concepts in blueprint reading and specifications in order to develop basic electrical circuit drawings.	12. Create basic electrical drawings. AAI 4. Technical and Production Skills: Identify specific production and technical skills required for this industry.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> As an apprentice your foreman has asked you to derive a list of materials from a set of electrical drawings. Cont. to #13.	1	2	3	4
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	<p>13. Analyze blueprints and project specifications. AAI 5. Underlying Principles of Technology: Explain through discussion the technological systems used within this industry.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
<p>Understand the concepts, processes and procedures in selecting and installing electrical boxes in order to provide power for devices and lighting.</p>	<p>14. Identify boxes and cover plate and determine size, location and type.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p>As an apprentice your foreman has required you to select and install the correct boxes for a new dwelling. Cont. to #15</p>	1	2	3	4
1	2	3	4				
	<p>15. Install a device box to a given height and wall thickness and install a luminaire box.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
<p>Understand concepts, safety and processes of switching in order to provide control for electrical circuits.</p>	<p>16. Wire a single pole switch controlling a lighting outlet with the supply entering the switch and with the supply entering the light. AAI 4. Technical and Production Skills: Identify specific production and technical skills required for this industry.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p>As an apprentice your foreman has asked you to rough in a dwelling unit. Cont. to # 20 and, 41, 42, & 43.</p>	1	2	3	4
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	<p>17. Wire two three-way switches controlling a lighting outlet with the supply entering the switches and with the supply entering the light.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	<p>18. Wire two three-way and one four-way switch controlling a lighting outlet with the supply entering the four-way and entering the light.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
<p>Understand the concepts, safety, and procedures in installing and wiring electrical device outlets in order to provide 120V/208V/240V circuits.</p>	<p>19. Wire various receptacles (duplex, split-wired duplex, switched controlled duplex, GFCI) and wire a multi-wire branch circuit connected to a duplex receptacle.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	<p>20. Wire a 50 amp range outlet and a 30 amp dryer outlet.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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<p>Understand the process and procedure to install panel board and the concept of over-current protection in order to provide safe power distribution.</p>	<p>21. Identify types of over-current protection. (AFCI-GFCI)</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> <p>Today your foreman has asked you to tie in the all the branch circuits into the panel board. Cont. to #23.</p>	1	2	3	4
	1	2	3	4			
	<p>22. Recognize ampere interrupting capacity rating, effective incident energy, ground fault and short circuit.</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
<p>23. Identify the parts and types of panel boards.</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4	
1	2	3	4				
<p>Understand the procedures and process to install a residential service in order to provide power to a service panel.</p>	<p>24. Connect a utility meter socket to a main panel or main disconnect.</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> <p>As an apprentice you will assist a journeyman electrician on a residential service change. Cont. to #27.</p>	1	2	3	4
	1	2	3	4			
	<p>25. Properly ground and bond a service.</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
<p>26. Install overhead service and underground service.</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4	
1	2	3	4				

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	27. Create a panel board directory.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
<p>Understand fundamental concepts of alternative power supplies to provide a safe, compliant installation.</p>	28. Design a residential generator installation.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p>As apprentice you have been tasked in detailing the components required in a residential generator installation.</p>	1	2	3	4
1	2	3	4				
<p>Understand the concepts and safely trouble-shoot electrical systems in order to repair circuits.</p>	29. Trouble-shoot, diagnose, and repair electrical systems (70E).		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p>As apprentice you will assist a journeyman electrician troubleshooting a faulty circuit.</p>	1	2	3	4
1	2	3	4				
<p>Understand the process and procedure of electrical estimating to determine costs to the contractor and consumer.</p>	30. Review cost and value of materials.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p>As an apprentice you have to estimate the costs and materials for an addition on a dwelling. Cont. to #31.</p>	1	2	3	4
1	2	3	4				
	31. Estimate materials needed for residential wiring.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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<p>Understand the concepts, processes and techniques of raceway use and installation in order to meet the requirements of the National Electric Code.</p>	<p>32. Identify different types of raceways and the different types of supports and fittings used with raceways.</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> <p>On today’s job, you have been asked to select and install the correct raceway. Cont. to #38.</p>	1	2	3	4
	1	2	3	4			
<p>33.. Discuss , identify and Follow National Electrical Code (NEC) requirements for: - electrical metallic tubing (EMT) - ridged metallic conduit - PVC and - raceway fill</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4	
1	2	3	4				
	<p>34. Create offsets using 3 degree settings (EMT)</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	<p>35. Prepare ½” box offset, 90° bend, and a back-to-back 90° bend (EMT)</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	<p>36. Prepare a three-point saddle and a four-point saddle using EMT.</p>		<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
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	37. Bend PVC conduit with listed bender.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
<p>Understand the concepts and procedures of basic motor control systems in order to provide control circuits for motors.</p>	38. Wire a motor controlled by a single pushbutton station and a single contactor, and wire a motor controlled by two pushbutton stations and a single contactor.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p>You have a job where you have to install a motor starter for a septic pump. Cont. to #43</p>	1	2	3	4
1	2	3	4				
	39. Properly size motor overload protection, branch circuit protection and conductor size.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
<p>Understand the concepts and procedures of luminaire installation and repair in order to install and maintain luminaires.</p>	40. Identify different luminaire and lamp types and wire according to manufacturer's instructions.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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Understand the concepts and techniques used in branch circuits to provide branch circuits that meet the requirements of the National Electric Code.	41. Identify and demonstrate (how, where and what size): - small appliance branch circuits - general lighting circuits - requirements for a single family dwelling -AFCI -GFCI		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
Understand the concepts and installation procedures to provide low voltage circuits and devices.	42. Install: - chime circuits - telecommunications cabling - low voltage controls (class 2 & class 3)		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
Understand the National Electrical Code and practice in order to provide circuits free from electrical hazards.	43. Recognize and discuss all relevant Articles of NEC		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> As an apprentice you have to determine minimum burial depth of cable to a lamp post at a dwelling unit.	1	2	3	4
1	2	3	4				
Understand municipalities' ordinances, requirements, permits/inspections, and fee procedures in order to provide legal electrical installations.	44. Apprentices will be aware of apprentice's registration requirements and further licensing requirements.		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> As an apprentice you have to keep track of your working hours in order to satisfy state requirements.	1	2	3	4
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	<p>45. Identify and define electrical permitting process according to the authority having jurisdiction.</p>		<table border="1" style="width: 100%;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table> <p>As an apprentice you will accompany the master electrician to pull the permit for the job. Cont. to # 47</p>	1	2	3	4
1	2	3	4				
	<p>46. Identify and define rough inspection and finish inspection.</p>		<table border="1" style="width: 100%;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table>	1	2	3	4
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PROGRAM COMPETENCY PROFILE FOR CAREER TECHNICAL EDUCATION
Career Cluster: Architecture and Construction

Program Name: Electrician CIP: 460302

Effective 6/2012

National Standard: National Fire Protection Association – 70: National Electric Code

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<p>Understand the fundamental concepts of entrepreneurship and how entrepreneurship influences the economy.</p>	<p>47. Discuss and assess business/venture creation possibilities and identify the steps in planning the business/venture (growth, development, demise)-- (traits and behaviors of an entrepreneur) AAI 1. Planning: Explain the key elements of a long-term plan for a successful company. AAI 2. Management: Discuss the different forms of management and ownership within this industry. AAI 3. Finance: Explain the key components of financial management of a company. AAI 6. Labor Issues: Explain the employees’ and employers’ rights and responsibilities in this industry. AAI 7. Community Issues: Discuss the ways a company can impact its community and the ways a community can impact a company.</p>		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p>As an apprentice you are required to attend the company’s monthly business meeting to gain awareness of current business issues.</p>	1	2	3	4
1	2	3	4				
<p>Understand the importance of personal growth and leadership to enhance career success.</p>	<p>48. Demonstrate personal growth, community leadership, democratic principles, and social responsibility by participating in activities/events offered through student organizations.</p>		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p>Your company is involved in a community service project, and you have been asked to participate.</p>	1	2	3	4
1	2	3	4				

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<p>Understand the necessary employability skills in order to achieve success in today’s workplace.</p>	<p>49. Decision-Making & Problem-Solving: Demonstrate and apply good decision-making and problem-solving skills by outlining issues in situations/problems and determining, collecting, and organizing information needed in order to formulate a solution.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p>For Example: As a 4th year apprentice your employer is training you to be a project foreman. Cont. to #53</p>	1	2	3	4
1	2	3	4				
	<p>50. Self –Management: Demonstrate and apply self-management skills by adhering to regulations, being responsible, and following through on commitments. AAI 9. Personal Work Habits: Explain the work habits an employer looks for in an employee in this industry.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	<p>51. Communication Skills: Demonstrate and apply effective communication skills: verbal (oral/written), visual, and listening.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	<p>52. Ability to Work with Others: Demonstrate and apply the necessary skills in order to work effectively with others.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	<p>53. Information Use - Research, Analysis, Technology: Demonstrate and apply the use of information through research, analysis, and technology.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p>For Example: As an apprentice you have been asked by a customer to estimate their energy use.</p>	1	2	3	4
1	2	3	4				

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	<p>54. Mathematical Concepts: Demonstrate mathematical and computation skills as applied to real world situations.</p>		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> <p>For Example: You are on the job site and do not have a tape measure. You have to do a rough estimate of a room by using another method of measuring.</p>	1	2	3	4
1	2	3	4				
	<p>55. General Safety: Demonstrate and apply safe practices and procedures in the workplace.</p>		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> <p>For Example: As a new employee you are required to complete the safety training required by the company by viewing the video and completing an assessment.</p>	1	2	3	4
1	2	3	4				
	<p>56. Career Development: Demonstrate personal/career development skills by completing a career plan.</p>		<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> <p>For Example: Your employer has asked you to develop a five-year plan to achieve a master’s license.</p>	1	2	3	4
1	2	3	4				

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