



## Course Description, Performance Objectives and Outline Analysis of Changes 2020 NEC - Part 4 – Article 690 through Chapter 9

### Course Description

Welcome to the course “Analysis of Changes 2020 NEC - Part 4 - Articles 690 through Chapter 9”. The instructor for this course is David Arnold, with expert code change support being provided by Keith Lofland, Director of Education at the International Association of Electrical Inspectors (IAEI).

This interactive distance-learning course is an extensive and popular program analyzing the major changes to the National Electric Code (NFPA 70™) for the 2020 cycle. Members of the eighteen NEC® code-making panels contributed to the development of the authoritative text used in this online course.

The course covers more than 50 of the most significant code changes in Articles 690 through Chapter 9. Specifically, the course covers code changes related to special equipment, special conditions, communications systems, tables and informative annexes.

### Performance Learning Objectives

Upon successful completion of this course participants will be able to:

- Identify code changes related to solar photovoltaic (PV) systems, fuel cell systems and fire pumps.
- Recognize changes to emergency systems, optional standby systems, interconnected electric power production sources and energy storage systems.
- Define proper changes to uses for critical operations powers systems, stand-alone systems, direct current microgrids and power-limited circuits.
- Understand changes regarding fire alarm systems and optical fiber cables.
- Describe code changes related to radio and television equipment, premises-powered broadband communications systems, notes to tables and informative annexes.

## Timed Course Outline – 4 Online CE Hours

**Note: Timing based on actual audio running time, analysis of change text @ 500 words per minute, quiz questions @ 30 seconds each and final exam questions @ 1 minute each. No seat time allotted for Summary of Change tab.**

### I. Introduction and Copyright (0 minutes used in seat time calculation)

- Welcome to IAEI and Pace - NFPA, NEC Copyright Information 2020
- Course Orientation
- Performance Learning Objectives
- Course Syllabus
- Course Interface Instructions
- Ask the instructor

### II. Article Articles 690.2 - 690.15 (43 minutes)

- 690.2 Definition of Grounded, Functionally
- 690.4(B) Solar Photovoltaic (PV) Systems Equipment
- 690.8(A) Maximum Current for Specific PV Circuits
- 690.9(A) Overcurrent Protection in Solar Photovoltaic (PV) Systems
- 690.12 Rapid Shutdown of PV Systems
- 690.13(A) Photovoltaic System Disconnecting Means
- 690.13(E) Types of Disconnects for Photovoltaic Systems
- 690.15 Disconnecting Means for Photovoltaic Equipment
- Articles 690.2 - 690.15 Quiz

### III. Articles 690.31 – 695 (43 minutes)

- 690.31 Wiring Methods for PV Installations
- 690.33(C) Mating Connectors for Photovoltaic PV Systems
- 690.41(B) PV System dc Circuits Exceeding 30 Volts or 8 Amperes
- 690.51, 690.53 Marking of Modules and AC Modules (Strike-through on 690.52 if possible; else remove)
- 690.56(C) Identification of Power Sources
- Informational Note Figure 691.1 I-Note No. 3 and Informational Note Figure 691.1
- 692.4(B) Identification of Power Sources in Fuel Cell Systems
- 695.3(C)(3) Selective Coordination of OCPD for Fire Pumps
- 695.6(J) Terminations Fittings at a Fire Pump Controller
- Articles 690.31 - 695 Quiz

IV. Articles 700 – 705 (26 minutes)

- 700.5(A) Meter Mounted Transfer Switches
- 700.12(B) Emergency System Equipment
- 700.12(H) DC Microgrid Systems
- 700.32 Informational Note and Informational Note Figure 700.32 Informational Note Figure 700.32
- 702.7(A) Sign Indicating Optional Standby Power Source
- Article 705 Interconnected Electric Power Production Sources
- Articles 700 - 705 Quiz

V. Article 706 – 710 (26 minutes)

- 706.1 Energy Storage Systems
- 706.2 Energy Storage System (ESS)
- 706.4 Nameplates for Energy Storage Systems
- 706.7 Maintenance of Energy Storage Systems (ESS)
- 706.9 Maximum Voltage of an ESS
- 706.30(A)(1) Nameplate-Rated Circuit Current
- 708.24(D) Bypass Isolation Automatic Transfer Switches
- 710.15 Stand-Alone Systems with Three-Phase Applications
- Articles 706 - 710 Quiz

VI. Articles 712 – 770 (39 minutes)

- 712.2 Grounded, Functionally
- 712.10(B) Building Directory for Direct Current Microgrids
- 725.48(B)(1) Class 1 Circuits and Power-Supply Circuits
- 725.144 and Table 725.144 Transmission of Power and Data
- 760.121(B) Fire Alarm Circuit Disconnect for Power-Limited Fire Alarm (PLFA) Circuits
- 770.24 Optical Fiber Cable
- 770.110(D) Optical Fiber Cables in Cable Tray Systems
- 770.133(A) and (B) Optical Fiber Cables and Electrical Conductors
- Articles 712 - 770 Quiz

VII. Chapter 8 (32 minutes)

- Article 800 General Requirements for Communications Systems
- 800.2 Communications Circuit
- 800.3 General Requirements for Communications Systems
- 800.27 Temperature Limitation of Wire and Cables
- 800.44(C) and (D) Overhead (Aerial) Communications Wires and Cables

- 805.179(D) Limited Power (LP) Cables
- 840.2 Premises-Powered Broadband Communications Systems
- 840.94 and 840.102 Premises Circuits Leaving the Building
- 840.160 Premises-Powered Broadband Communication Systems
- Chapter 8 Quiz

VIII. Chapter 9

(20 minutes)

- Chapter 9, Notes to Tables, Note (2) Complete Conduit or Tubing Systems
- Informative Annex A Product Safety Standards
- Informative Annex C Conduit, Tubing, and Cable Tray Fill Tables for Conductors and Fixture Wires of the Same Size
- Informative Annex D Example D5(b)
- Informative Annex D Example D8
- Informative Annex H Administration and Enforcement
- Chapter 9 Quiz

**Total Seat Time:        229 minutes**

*Utah Electrician (DOPL)*  
*Continuing Education Course Completion Certificate*

***David Arnold***

License Number: 123456

*This certifies that the individual named has successfully  
completed the course requirements for:*

*Analysis of Changes 2020 NEC - Part 4 – Article 690 through Chapter 9*

Course Approval Number: xxxxx

*which was completed on 4/21/2022  
and has earned 4.00 continuing education hours.*

*Online course provided by:*

**The Media Factory, Inc. (d/b/a PacePDH.com)**

Tampa, FL 33609

(813) 830-6523

Instructor Name: Jody Wages



[www.pacepdh.com](http://www.pacepdh.com)

A handwritten signature in black ink, appearing to read "Ron May".

*Ron May, Vice President*



# Course Syllabus

## **Sponsor / Facilitator Information**

David Arnold  
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## **Instructor / Code Change Content Expert**

Jody Wages, Director of Digital Education  
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## **Assignments and Homework:**

This is an online course. All course work is contained within the course itself. There are no additional assignments or homework outside the course itself.

## **Broadcast Schedules:**

All portions of this course may be taken at any time 24/7, at the student's discretion.

## **Student Material Requirements:**

This course requires an Internet connection. While the course will play using a slower connection, a higher speed connection (e.g. DSL or cable modem) is recommended because of the extensive use of audio in the course. The course also can be played on a tablet or smart phone.

## **Testing and Grading Information:**

The course includes quizzes throughout the course, typically about every half hour. The

passing score for the quizzes is 70%. The *NEC*® 2020 code book may be used as a reference during testing.

### **Library and Resource Information:**

Strikethrough code language, showing previous 2017 code language that has been changed or deleted in the 2020 *NEC*, is available in the Summary of Change tab at the end of each code change slide.

### **Deadlines:**

There are no deadlines imposed by PacePDH.com and our courses do not expire. However, to receive credit, the course should be completed before the Board/jurisdiction course approval date expires. The system will not allow you to launch a course that is expired. Obviously, you should try to complete the course before your individual license renewal period ends.

### **Registration Period:**

You may register for this course at any time.

### **Fees and Refunds:**

PacePDH.com typically receives course tuition payments in advance via student credit or debit card payments through its secure online Web portal. Checks are also accepted; in which case courses are assigned once the check is received. For company or group purchases, payment terms may be given.

PacePDH.com's refund policy is simple, a full cash refund is offered for up to 90 days or until the course has been completed, whichever comes first. After the 90 day period courses that have not been completed can be converted into course credits for other Pace offerings. For example, if a student has completed one hour of a four-hour online course and then decides they do not want to complete the course, a full refund is still offered if it is within 90 days of the purchase date, otherwise a course credit is offered. Once the online course has been completed, as determined by our LMS (learning management system), a refund is no longer offered.

### **ADA Information:**

This course is not compliant with Section 508 of the U.S. Rehabilitation Act.

### **Technology Support Services:**

Tech support for students is available Monday through Friday 8AM to 6PM eastern time. Afterhours and weekend support is offered at times. Support is available by phone at

(800) 576-4341, via Web form at <http://www.pacepdh.com/index.cfm?fuseaction=custom.contact> or via e-mail at [PaceSupport@PacePDH.com](mailto:PaceSupport@PacePDH.com) .

**Completion and Assignment Time Lines:**

See “Deadlines” above.

**Prior Learning Assessments / Prerequisites:**

There are no prerequisites for this course. Course interface/navigation instructions, “Ask the Instructor” and directions on how to take personal course notes are provided at the beginning of the course.