

**APPENDIX 5.**

**INDUSTRY STANDARDS**

# HEALTHCARE TECHNOLOGY STANDARDS

## SOURCES:

National Healthcare Foundation Standards and Accountability Criteria

[www.healthscienceconsortium.org](http://www.healthscienceconsortium.org)

Occupational Outlook Handbook

(U.S. Bureau of Labor Statistics/Office of Occupational Statistics and Employment Projections)

# NATIONAL HEALTHCARE FOUNDATION STANDARDS AND ACCOUNTABILITY CRITERIA

October 2013

Accountability criteria have been established for each foundation standard to better define the expectations for meeting the standard, to provide content for curriculum design and measurement, and certification of achievement.

## Foundation Standard 1: Academic Foundation

Healthcare professionals will know the academic subject matter required for proficiency within their area. They will use this knowledge as needed in their role. The following accountability criteria are considered essential for students in a health science program of study.

### Accountability Criteria

#### 1.1 Human Structure and Function

- 1.11 Classify the basic structural and functional organization of the human body (tissue, organ, and system).
- 1.12 Recognize body planes, directional terms, quadrants, and cavities.
- 1.13 Analyze the basic structure and function of the human body.

#### 1.2 Diseases and Disorders

- 1.21 Research common diseases and disorders of each body system (prevention, pathology, diagnosis, and treatment).
- 1.22 Research emerging diseases and disorders.
- 1.23 Investigate biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

#### 1.3 Medical Mathematics

- 1.31 Apply mathematical computations related to healthcare procedures (metric and household, conversions and measurements).
- 1.32 Analyze diagrams, charts, graphs, and tables to interpret healthcare results.
- 1.33 Record time using the 24-hour clock.

## Foundation Standard 2: Communications

Healthcare professionals will know the various methods of giving and obtaining information. They will communicate effectively, both orally and in writing.

### Accountability Criteria

#### 2.1 Concepts of Effective Communication

- 2.11 Interpret verbal and nonverbal communication.
- 2.12 Identify barriers to communication.
- 2.13 Report subjective and objective information.
- 2.14 Interpret the elements of communication using a basic sender-receiver-feedback model.
- 2.15 Apply speaking and active listening skills.
- 2.16 Modify communication to meet the needs of the patient/client and to be appropriate to the situation.

#### 2.2 Medical Terminology

- 2.21 Use roots, prefixes, and suffixes to communicate information.
- 2.22 Use medical abbreviations to communicate information.

#### 2.3 Written Communication Skills

- 2.31 Critique elements of written and electronic communication (spelling, grammar, and formatting).
- 2.32 Prepare examples of technical, informative, and creative writing.

## **Foundation Standard 3: Systems**

**Healthcare professionals will understand how their role fits into their department, their organization and the overall healthcare environment. They will identify how key systems affect services they perform and quality of care.**

### **Accountability Criteria**

#### **3.1 Healthcare Delivery Systems**

- 3.11 Understand the healthcare delivery system (public, private, government, and non-profit).
- 3.12 Describe the responsibilities of consumers within the healthcare system.
- 3.13 Assess the impact of emerging issues on healthcare delivery systems.
- 3.14 Discuss healthcare economics and common methods of payment for healthcare.

## **Foundation Standard 4: Employability Skills**

**Healthcare professionals will understand how employability skills enhance their employment opportunities and job satisfaction. They will demonstrate key employability skills and will maintain and upgrade skills, as needed.**

### **Accountability Criteria**

#### **4.1 Personal Traits of the Healthcare Professional**

- 4.11 Classify the personal traits and attitudes desirable in a member of the healthcare team.
- 4.12 Summarize professional standards as they apply to hygiene, dress, language, confidentiality and behavior.

#### **4.2 Employability Skills**

- 4.21 Apply employability skills in healthcare.

#### **4.3 Career Decision-making**

- 4.31 Discuss levels of education, credentialing requirements, and employment trends in healthcare.
- 4.32 Compare careers within the health science career pathways (diagnostic services, therapeutic services, health informatics, support services, or biotechnology research and development).

#### **4.4 Employability Preparation**

- 4.41 Develop components of a personal portfolio.
- 4.42 Identify innovative strategies for obtaining employment.

## **Foundation Standard 5: Legal Responsibilities**

**Healthcare professionals will understand the legal responsibilities, limitations, and implications of their actions within the healthcare delivery setting. They will perform their duties according to regulations, policies, laws and legislated rights of clients.**

### **Accountability Criteria**

#### **5.1 Legal Implications**

- 5.11 Analyze legal responsibilities and limitations.
- 5.12 Apply procedures for accurate documentation and use of electronic and print health records.

#### **5.2 Legal Practices**

- 5.21 Apply standards for the privacy and confidentiality of health information (HIPAA).
- 5.22 Describe advance directives.
- 5.23 Summarize the essential characteristics of a patient's basic rights within a healthcare setting.
- 5.24 Understand informed consent.
- 5.25 Differentiate laws governing harassment, labor and scope of practice.

## **Foundation Standard 6: Ethics**

**Healthcare professionals will understand accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment. They will perform quality healthcare delivery.**

## **Accountability Criteria**

### **6.1 Ethical Practice**

- 6.11 Differentiate between ethical and legal issues impacting healthcare.
- 6.12 Recognize ethical issues and their implications related to healthcare.
- 6.13 Utilize procedures for reporting activities and behaviors that affect the health, safety, and welfare of others.

### **6.2 Cultural, Social, and Ethnic Diversity**

- 6.21 Research religious and cultural values as they impact healthcare and develop plans/guidelines for addressing cultural diversity.
- 6.22 Demonstrate respectful and empathetic treatment of ALL patients/clients (customer service).

## **Foundation Standard 7: Safety Practices**

**Healthcare professionals will understand the existing and potential hazards to clients, co-workers, and self. They will prevent injury or illness through safe work practices and follow health and safety policies and procedures.**

## **Accountability Criteria**

### **7.1 Infection Control**

- 7.11 Explain principles of infection control.
- 7.12 Assess methods of controlling the spread and growth of microorganisms.

### **7.2 Personal Safety**

- 7.21 Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.
- 7.22 Apply principles of body mechanics.

### **7.3 Environmental Safety**

- 7.31 Apply safety techniques in the work environment.

### **7.4 Common Safety Hazards**

- 7.41 Recognize Safety Data Sheets (SDSs). ([www.osha.gov](http://www.osha.gov))
- 7.42 Comply with safety signs, symbols, and labels.

### **7.5 Emergency Procedures and Protocols**

- 7.51 Practice fire safety in a healthcare setting.
- 7.52 Apply principles of basic emergency response in natural disasters and other emergencies.

## **Foundation Standard 8: Teamwork**

**Healthcare professionals will understand the roles and responsibilities of individual members as part of the healthcare team, including their ability to promote the delivery of quality healthcare. They will interact effectively and sensitively with all members of the healthcare team.**

## **Accountability Criteria**

### **8.1 Healthcare Teams**

- 8.11 Understand roles and responsibilities of team members.
- 8.12 Recognize characteristics of effective teams.

### **8.2 Team Member Participation**

- 8.21 Differentiate creative methods for building positive team relationships.
- 8.22 Analyze attributes and attitudes of an effective leader.
- 8.23 Apply effective techniques for managing team conflict.

## **Foundation Standard 9: Health Maintenance Practices**

**Healthcare professionals will understand the fundamentals of wellness and the prevention of disease processes. They will practice preventive health behaviors among the clients.**

### **Accountability Criteria**

#### **9.1 Healthy Behaviors**

9.11 Apply behaviors that promote health and wellness.

9.12 Describe strategies for the prevention of diseases including health screenings and examinations.

9.13 Investigate complementary (alternative) health practices as they relate to wellness and disease prevention.

## **\*Foundation Standard 10: Technical Skills**

**Healthcare professionals will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.**

### **Accountability Criteria**

#### **10.1 Technical Skills**

10.11 Apply procedures for measuring and recording vital signs including the normal ranges.

10.12 Apply skills to obtain training or certification in cardiopulmonary resuscitation (CPR), automated external defibrillator (AED), foreign body airway obstruction (FBAO) and first aid.

\*Additional technical skills may be included in a program of study based on career specialties.

## **Foundation Standard 11: Information Technology Applications**

**Healthcare professionals will use information technology applications required within all career specialties. They will demonstrate use as appropriate to healthcare applications.**

### **Accountability Criteria**

#### **11.1 Health Information Literacy and Skills**

11.11 Identify methods and types of data collected in healthcare.

11.12 Use health record data collection tools (such as input screens, document templates).

11.13 Differentiate between types and content of health records (patient, pharmacy, and laboratory).

11.14 Create documentation in the health record that reflects timeliness, completeness, and accuracy.

11.15 Adhere to information systems policies and procedures as required by national, state, local, and organizational levels.

#### **11.2 Privacy and Confidentiality of Health Information**

11.21 Apply the fundamentals of privacy and confidentiality policies and procedures.

11.22 Identify legal and regulatory requirements related to the use of personal health information.

11.23 Identify and apply policies and procedures for access and disclosure of personal health information.

11.24 Describe the consequences of inappropriate use of health data in terms of disciplinary action.

11.25 Describe appropriate methods to correct inaccurate information/errors personally entered into an electronic medical record (EMR).

#### **11.3 Basic Computer Literacy Skills**

11.31 Apply basic computer concepts and terminology in order to use computers and other mobile devices.

11.32 Demonstrate basic computer operating procedures.

11.33 Demonstrate use of file organization and information storage.

11.34 Use basic word processing, spreadsheet, and database applications.

11.35 Evaluate the validity of web-based resources.

11.36 Demonstrate use of appropriate email and social media usage.



## Medical Records and Health Information Technicians

### Summary



Health information technicians need to be able to discuss patient information and discrepancies with other professionals such as physicians and insurance personnel.

#### Quick Facts: Medical Records and Health Information Technicians

<b>2012 Median Pay</b>	\$34,160 per year ; \$16.42 per hour
<b>Entry-Level Education</b>	Postsecondary non-degree award
<b>Work Experience in a Related Occupation</b>	None
<b>On-the-job Training</b>	None
<b>Number of Jobs, 2012</b>	186,300
<b>Job Outlook, 2012-22</b>	22% (Much faster than average)
<b>Employment Change, 2012-22</b>	41,100

## **What Medical Records and Health Information Technicians Do**

Medical records and health information technicians, commonly referred to as health information technicians, organize and manage health information data. They ensure its quality, accuracy, accessibility, and security in both paper and electronic systems. They use various classification systems to code and categorize patient information for insurance reimbursement purposes, for databases and registries, and to maintain patients' medical and treatment histories.

### **Work Environment**

Health information technicians held about 186,300 jobs in 2012. Most health information technicians work in hospitals or physicians' offices.

### **How to Become a Medical Records or Health Information Technician**

Health information technicians typically need a postsecondary certificate to enter the occupation, although they may have an associate's degree. Many employers also require professional certification.

### **Pay**

The median annual wage for health information technicians was \$34,160 in May 2012.

### **Job Outlook**

Employment of health information technicians is projected to grow 22 percent from 2012 to 2022, much faster than the average for all occupations. The demand for health services is expected to increase as the population ages.

### **Similar Occupations**

Compare the job duties, education, job growth, and pay of medical records and health information technicians with similar occupations.

### **More Information, Including Links to O\*NET**

Learn more about medical records and health information technicians by visiting additional resources, including O\*NET, a source on key characteristics of workers and occupations.

## **What Medical Records and Health Information Technicians Do**

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Technicians assemble patients' health information including medical history, symptoms, examination results, tests, and treatments.

Medical records and health information technicians, commonly referred to as health information technicians, organize and manage health information data by ensuring its quality, accuracy, accessibility, and security in both paper and electronic systems. They use various classification systems to code and categorize patient information for insurance reimbursement purposes, for databases and registries, and to maintain patients' medical and treatment histories.

## Duties

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Health information technicians typically do the following:

- Review patient records for timeliness, completeness, accuracy, and appropriateness of data
- Organize and maintain data for clinical databases and registries
- Track patient outcomes for quality assessment
- Use classification software to assign clinical codes for reimbursement and data analysis
- Electronically record data for collection, storage, analysis, retrieval, and reporting
- Protect patients' health information for confidentiality, authorized access for treatment, and data security

All health information technicians document patients' health information, including their medical history, symptoms, examination and test results, treatments, and other information about healthcare services that are provided to patients. Their duties vary with the size of the facility in which they work.

Although health information technicians do not provide direct patient care, they work regularly with [registered nurses](#) and other healthcare professionals. They meet with these workers to clarify diagnoses or to get additional information to make sure that records are complete and accurate.

The increasing use of electronic health records (EHRs) will continue to change the job responsibilities of health information technicians. Federal legislation provides incentives for physicians' offices and hospitals to implement EHR systems into their practice. This will lead to continued adoption of this software in these facilities. Technicians will need to be familiar with, or be able to learn, EHR computer software, follow EHR security and privacy practices, and analyze electronic data to improve healthcare information as more healthcare providers and hospitals adopt EHR systems.

Health information technicians can specialize in many aspects of health information. Some work as medical coders, sometimes called coding specialists, or as cancer registrars.

**Medical coders** typically do the following:

- Review patient information for preexisting conditions such as diabetes
- Retrieve patient records for medical personnel

- Work as a liaison between the health clinician and billing offices

**Cancer registrars** typically do the following:

- Review patient records and pathology reports for completeness and accuracy
- Assign classification codes to represent the diagnosis and treatment of cancers and benign tumors
- Conduct annual follow-ups to track treatment, survival, and recovery
- Analyze and compile cancer patient information for research purposes
- Maintain facility, regional, and national databases of cancer patients

## Work Environment

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This is one of the few health-related occupations in which there is no direct hands-on patient care.

Health information technicians held about 186,300 jobs in 2012. Most health information technicians work in hospitals or physicians' offices. Others work in nursing care facilities or for government entities. Technicians typically work at desks or in offices and may spend many hours in front of computer monitors.

The industries that employed the most health information technicians in 2012 were as follows:

General medical and surgical hospitals; state, local, and private	37%
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Offices of physicians	22
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Nursing and residential care facilities	9
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Government	5
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## Work Schedules

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Most health information technicians work full time. In healthcare facilities that are always open, such as hospitals, technicians may work evening or overnight shifts.

## How to Become a Medical Records or Health Information Technician

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Technicians organize and maintain data for clinical databases and registries.

Health information technicians typically need a postsecondary certificate to enter the occupation, although they may have an associate's degree. Many employers also require professional certification.

## Education

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Postsecondary certificate and associate's degree programs in health information technology typically include courses in medical terminology, anatomy and physiology, health data requirements and standards, classification and coding systems, healthcare reimbursement methods, healthcare statistics, and computer systems. Applicants to health information technology programs increase their chances of admission by taking high school courses in health, computer science, math, and biology.

## Important Qualities

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**Analytical skills.** Health information technicians must be able to understand and follow medical records and diagnoses, and then decide how best to code them in a patient's medical records.

**Detail oriented.** Health information technicians must be accurate when recording and coding patient information.

**Integrity.** Health information technicians work with patient data that are required, by law, to be kept confidential. They must exercise caution when working with this information in order to protect patient confidentiality.

**Interpersonal skills.** Health information technicians need to be able to discuss patient information, discrepancies, and data requirements with other professionals such as physicians and finance personnel.

**Technical skills.** Health information technicians must be able to use coding and classification software and the EHR system that their healthcare organization or physician practice has adopted.

## **Licenses, Certifications, and Registrations**

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Most employers prefer to hire health information technicians who have professional certification. A health information technician can earn certification from several organizations. Some organizations base certification on passing an exam. Others require graduation from an accredited program. Once certified, technicians typically must renew their certification regularly and take continuing education courses. Certifications include Registered Health Information Technician (RHIT) and Certified Tumor Registrar (CTR), among others. Many coding certifications require coding experience in a work setting.

## **Advancement**

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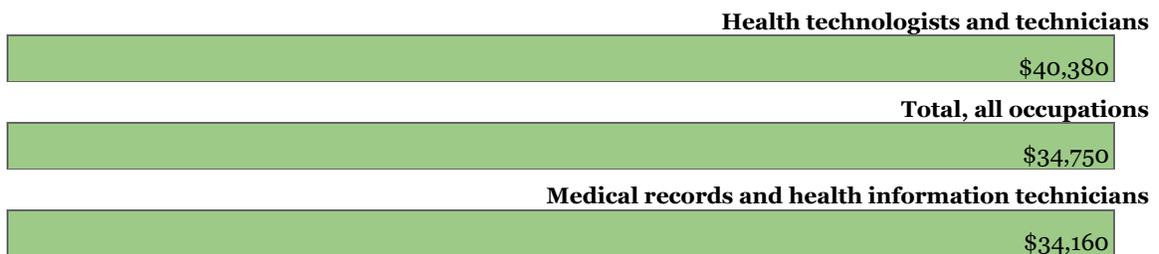
Health information technicians may advance to other health information positions by receiving additional education and certifications. Technicians can advance to a [medical or health services manager](#) after completing a bachelor's or master's degree program and taking the required certification courses. Requirements vary by facility.

## **Pay**

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### **Medical Records and Health Information Technicians**

Median annual wages, May 2012



Note: All Occupations includes all occupations in the U.S. Economy.

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics

The median annual wage for health information technicians was \$34,160 in May 2012. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$22,250, and the top 10 percent earned more than \$56,200.

Most health information technicians work full time. In healthcare facilities that are always open, such as hospitals, technicians may work evening or overnight shifts.

## Job Outlook

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### Medical Records and Health Information Technicians

Percent change in employment, projected 2012-22



Note: All Occupations includes all occupations in the U.S. Economy.

Source: U.S. Bureau of Labor Statistics, Employment Projections program

Employment of health information technicians is projected to grow 22 percent from 2012 to 2022, much faster than the average for all occupations. The demand for health services is expected to increase as the population ages. An aging population will need more medical tests, treatments, and procedures. This will mean more claims for reimbursement from insurance companies. Additional records, coupled with widespread use of electronic health records (EHRs) by all types of healthcare providers, could lead to an increased need for technicians to organize and manage the associated information in all areas of the healthcare industry.

Cancer registrars are expected to continue to be in high demand. As the population ages, there will likely be more types of special purpose registries because many illnesses are detected and treated later in life.

## Job Prospects

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Prospects will be best for those with a certification in health information, such as the RHIT or the CTR. As EHR systems continue to become more common, health information technicians with computer skills will be needed to use them.

## Employment projections data for Medical Records and Health Information Technicians, 2012-22

Occupational Title	SOC Code	Employment, 2012	Projected Employment, 2022	Change, 2012-22		Employment by Industry
				Percent	Numeric	
SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program						
Medical records and health information technicians	29-2071	186,300	227,500	22	41,100	<a href="#">[XLS]</a>

## Similar Occupations

This table shows a list of occupations with job duties that are similar to those of medical records and health information technicians.

	OCCUPATION	JOB DUTIES	ENTRY-LEVEL EDUCATION	2012 MEDIAN PAY
	<a href="#"><u>Medical Transcriptionists</u></a>	Medical transcriptionists listen to voice recordings that physicians and other healthcare professionals make and convert them into written reports. They may also review and edit medical documents created using speech recognition technology. Transcriptionists interpret medical terminology and abbreviations in preparing patients' medical histories, discharge summaries, and other documents.	Postsecondary non-degree award	\$34,020
	<a href="#"><u>Medical and Health Services Managers</u></a>	Medical and health services managers, also called healthcare executives or healthcare administrators, plan, direct, and coordinate medical and health services. They might manage an entire facility or specialize in managing a specific clinical area or department, or manage a medical practice for a group of physicians. Medical and health services managers must be able to adapt to changes in healthcare laws, regulations, and technology.	Bachelor's degree	\$88,580

## Contacts for More Information

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For more information about health information technicians, including details about certification, visit

[American Health Information Management Association](#)

[American Academy of Professional Coders](#)

[Professional Association of Healthcare Coding Specialists](#)

[National Cancer Registrars Association](#)

[National Healthcareer Association](#)

For more information about medical coding and billing, visit

[Medical Coding & Billing Online](#)

For a list of accredited training programs, visit

[Commission on Accreditation for Health Informatics and Information Management Education](#)

## O\*NET

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[Medical Records and Health Information Technicians](#)

### **Suggested citation:**

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2014-15 Edition*, Medical Records and Health Information Technicians, on the Internet at <http://www.bls.gov/ooh/healthcare/medical-records-and-health-information-technicians.htm> (visited May 21, 2015).

**Publish Date:** Wednesday, January 8, 2014

# Production Technician Industry Standards

## Sources:

Manufacturing Skills Standards Council (MSSC)

([www.msscusa.org](http://www.msscusa.org))

## **CERTIFIED PRODUCTION TECHNICIAN CRITICAL PRODUCTION FUNCTIONS COVERED BY MSSC COURSES AND ASSESSMENTS:**

The Manufacturing Skill Standards Council (MSSC) credentialing system leading to a CPT covers the four critical production functions, as defined by MSSC's industry-led, nationally validated skills standards, common to all sectors of manufacturing: Safety, Quality & Continuous Improvement, Manufacturing Processes & Production, and Maintenance Awareness. Each area is addressed with a separate assessment. MSSC training and assessments are organized around those four modules. An individual can earn a "Certificate" if they pass one or more assessments. However, they must pass all four assessments to earn the full "CPT" certification. MSSC strongly recommends that individuals be at the 9th grade level of math and 10th grade level of English before attempting MSSC courses and assessments. The four critical functions and their related key activities are described below:

### **SAFETY**

1. Work in a Safe and Productive Manufacturing Workplace
2. Perform safety and environmental inspections
3. Perform emergency drills and participate in emergency teams
4. Identify unsafe conditions and take corrective action
5. Provide safety orientation for all employees
6. Train personnel to use equipment safely
7. Suggest processes and procedures that support safety of work environment
8. Fulfill safety and health requirements for maintenance, installation, and repair
9. Monitor safe equipment and operator performance
10. Utilize effective, safety-enhancing workplace practices

### **QUALITY PRACTICES & MEASUREMENT**

1. Participate in periodic internal quality audit activities
2. Check calibration of gages and other data collection equipment
3. Suggest continuous improvements
4. Inspect materials and product/process at all stages to ensure they meet specifications
5. Document the results of quality tests
6. Communicate quality problems.
7. Take corrective actions to restore or maintain quality
8. Record process outcomes and trends
9. Identify fundamentals of blueprint reading
10. Use common measurement systems and precision measurement tools

### **MANUFACTURING PROCESSES & PRODUCTION**

1. Identify customer needs
2. Determine resources available for the production process
3. Set up equipment for the production process
4. Set team production goals
5. Make job assignments
6. Coordinate work flow with team members and other work groups
7. Communicate production and material requirements and product specifications
8. Perform and monitor the process to make the product
9. Document product and process compliance with customer requirements
10. Prepare final product for shipping or distribution

## **MAINTENANCE AWARENESS**

1. Perform preventive maintenance and routine repair
2. Monitor indicators to ensure correct operations
3. Perform all housekeeping to maintain production schedule
4. Recognize potential maintenance issues with basic production systems, including knowledge of when to inform maintenance personnel about problems with:

- Electrical systems
- Pneumatic systems
- Hydraulic systems
- Machine automation systems
- Lubrication processes
- Bearings and couplings
- Belts and chain drives

**NOTE:** MSSC assesses core understanding of the key work activities and core technical knowledge and skills needed in high-performance manufacturing, as defined by MSSC Production Skill Standards. Given online, MSSC Assessments also help measure basic computer, problem-solving and analytical skills and one's ability to apply knowledge to specific situations identified in the assessments. There are no experiential or hands-on requirements for MSSC certification as it is expected that individual employers will determine those requirements based upon their own specific needs. MSSC does not require that individuals take MSSC courses prior to testing.

## **CERTIFIED PRODUCTION TECHNICIAN CRITICAL WORK FUNCTIONS for GREEN PRODUCTION**

In October 2011, MSSC introduced a fifth module in the CPT program for Green Production. This module was developed with the same rigor as the other four and is based upon industry-defined, nationally validated skill standards. An individual receives a certificate for passing this module and may be included in the complete CPT program or offered as a standalone credential. Due to the emerging nature of Green Production, it is currently not required to earn a full-CPT certification.

MSSC strongly recommends that individuals be at the 9th grade level of math and 10th grade level of English before attempting this module.

MSSC defines Green Production as “workplace activities across all industries within the manufacturing sector that require the use of equipment, technologies, and processes that will improve the environmental performance of manufacturing companies.” Thus is it not limited to the manufacturing of green products but includes the “greening” of all manufacturing processes.

The key activities related to Green Production are described below:

1. Train Workers in Environmental Issues
2. Implement & Promote Environmental Program, Projects, Policies or Procedures
3. Conduct Environmental Incident and Hazard Investigations
4. Conduct Preventive Environmental Inspections
5. Monitor Environmental Aspects at Each Stage of Production
6. Implement Continuous Improvement in Environmental Assurance
7. Using Advanced Material in Production to Reduce Waste
8. Reprocess Materials by Recycling and Reuse

# ADVANCED MANUFACTURING/LOGISTICS AND ENERGY CORE INDUSTRY STANDARDS

## SOURCES:

National Electric Code

(<http://www.neca-neis.org>)

Advanced Manufacturing/Amatrol

([www.amatrol.com/program/advanced-manufacturing](http://www.amatrol.com/program/advanced-manufacturing))

National Institute for Metalworking Skills

(<http://www.nims-skills.org/web/nims>)

Interstate Renewable Energy Council

([www.irecusa.org](http://www.irecusa.org))

National Board of Certified Energy Practitioners

(<http://www.nabcep.org>)

NATIONAL ELECTRIC CODE

<http://www.neca-neis.org/safety-and-the-nec/the-national-electric-code-neca>



# National Electrical Installation Standards

Standards as High as Your Own

## THE NATIONAL ELECTRIC CODE & NECA

### **National Electrical Code® 2014**

The National Electrical Code® (NEC) is the most widely adopted Code in the world. Approved by the American National Standards Institute (ANSI), the NEC is the most complete set of electrical Code requirements that govern electrical installations in the interest of safety for persons and property. Knowledge of the NEC is an inherent part of doing business in the electrical industry.

With over 100 years of support in the NEC development process, NECA continues to be recognized as the leading voice of electrical contractors in the development of codes and standards. NECA was the first active participant in the NEC development process in the early 1900s and continues to be active today, with representation on each NEC technical committee.

The 2014 NEC was approved by the NFPA Standards Council in August 2013 and published in September 2013.

### **Standards Development**

NECA's role in the standards development process is important to the electrical industry, as it has been for over one hundred years. NECA is the voice of installers and

maintainers at the NEC hearings and helps develop Code rules that are understandable, practical, and enforceable. NECA takes this responsibility very seriously and values the opportunity to serve the industry working with NFPA in the development of the NEC and other key electrical industry standards.

## **National Electrical Code® 2017**

NECA is extensively involved in the NEC® development process, with representation on each NEC® Code-making panel, six chair positions on NEC technical committees and chairing the NEC Correlating Committee. NECA's representatives on the NEC Code-Making Panels hold the "installers and maintainers (I/M)" classification.

2017 NEC® Development Schedule (separate page, create link "See Activity for 2017 NEC Development")

AMATROL

<http://www.amatrol.com/program/advanced-manufacturing/>



## Amatrol's Advanced Manufacturing Program

### Advanced Manufacturing Skills For Workplace Success!

Advanced Manufacturing offers some of the highest paying and most satisfying career opportunities available today, such as manufacturing operators, maintenance technicians, quality control specialists, scientists, process control engineers, pharmaceutical professionals, and many more. Amatrol's Advanced Manufacturing program helps students develop the breadth and depth of technical skills they need to excel in technical support roles. Amatrol brings industrial realism to the classroom to teach job relevant skills needed today.

Amatrol's Advanced Manufacturing program showcases Integrated Systems Technology (IST), a unique way to combine hands-on skills with strong curriculum for an outstanding learner experience. The program offers multiple levels of study, starting with the basics and rapidly building into more sophisticated technology applications. With over 3,500 worldwide installations and growing, Amatrol continues to demonstrate a strong commitment to bridging the technical skill gaps in our workforce.

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## Job-Ready Skills

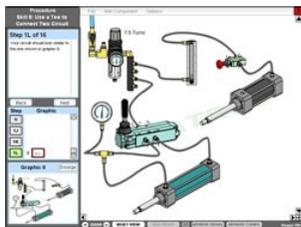


Amatrol's IST-based curriculum is designed to support a wide array of learning styles. Theory and hands-on skills are interwoven in a modular framework through Learning Activity Packets (LAPs). LAPs are integrated study units that support just-in-time skills through presentation of theory immediately reinforced with hands-on application. Repetition, active problem solving and self-reviews all provide feedback to students to build confidence in the skills they develop. Each topical area starts with basic concepts and then leads the student into a layered learning process of increasing depth. Skills and theory are strongly reinforced throughout Amatrol's curriculum regardless of how the student accesses it – printed LAPs, interactive multimedia LAPs or web-delivered LAPs. Skills learned in one LAP are often used in other LAPs to reinforce student learning.

Each Advanced Manufacturing topic incorporates the skill development needed for modern industry. From operation to complex troubleshooting, Amatrol's learning systems deliver job-ready skills. Throughout all learning topics are problem-solving activities that create adaptive skills for new situations such as component selection, sizing, system layout and program design. Workplace skills, such as working in a team, communicating ideas, etc. are emphasized as well.

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## Real Technical Skills Through PC Training



Extending the reach of real industrial skill training beyond the borders of a classroom has become essential as the skilled worker shortage continues to grow. Amatrol offers computer based interactive technical skill development via our multimedia software.

Amatrol's interactive multimedia curriculum uses a competency-based instructional design that teaches industry standard skills. Eye popping graphics, 3D simulation, video and complete explanations combine with strong interactivity to develop technical skills. Learners can practice real work outcomes at their own pace, speeding overall student learning and retention.

Amatrol's multimedia software training can be purchased for server/PC installation or accessed through our eLearning web portal for 24/7 access. Amatrol's multimedia is self-paced for individual use and can also be used in traditional class settings as a presentation tool.

Amatrol brings industrial realism to on-line learning through our new virtual trainers. Virtual trainers replicate hands-on equipment in such great detail that students will feel like they are using the actual equipment. Students perform essentially the same industry-based tasks using the virtual equipment that they would perform using actual equipment. Skills previously reserved for hardware-based trainers can now be delivered over the web. Virtual trainers provide a cost-effective way to create new technical skills or update skills amongst the incumbent workforce.

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### **Teaching Troubleshooting by Design**

Each Advanced Manufacturing topic incorporates the skill development needed for modern industry. From operation to complex troubleshooting, Amatrol's learning systems deliver job-ready skills. Amatrol's equipment and curriculum are designed to teach increasing levels of troubleshooting and problem-solving skills through:

- Computerized Fault Insertion
- Performance Measurement
- Application Devices
- Load Devices

Amatrol's unique computer-based fault insertion system, FaultPro, allows instructors to automatically insert faults and track student results. Instructors can confidently present students with challenging faults without risk of damaging the equipment. Amatrol is the only manufacturer of technical training equipment to offer automatic fault insertion. In addition to automatic fault insertion, Amatrol incorporates many types of applications and load devices, both inertial and friction types, to help teach troubleshooting under realistic industrial conditions.

Extensive instrumentation is used to measure torque, speed, current, pressure, flow, and voltage, further enhancing the troubleshooting learning experience for students.

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## **Advanced Manufacturing Realism With Flexible Training and Support!**

### **Industrial Quality Components – Manufacturing Realism**

Amatrol's learning systems feature heavy duty, industrial grade components similar to what students will see on the job. The range of component types spans what students will typically encounter in the workplace. For example, the 950-HT1, Amatrol's Hydraulic Troubleshooting, uses cast body pressure control valves, 2-stage DCVs, motors with drains, dial-type flow control valves, and JIC tie-rod cylinders. These are the types of components and materials students will commonly encounter on the job.

Extending the reach of real industrial skill training beyond the borders of a classroom has become essential as the skilled worker shortage continues to grow.

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### **Flexible Training Delivery and Support**

Amatrol provides a complete range of learning materials ranging from print-based curriculum to equipment trainers to on-line multimedia with virtual trainers. The LAP style curriculum supports teaching in almost any situation: open-entry / open-exit, traditional class lecture, or blended situations. Each LAP is a natural completion point. LAPs can be easily combined in different configurations to support college classes, industry short courses, cross-training needs, as well as advanced study. This same LAP style curriculum design is used throughout all Amatrol curriculum, increasing student learning with consistent presentation. Your success is our success. That's our philosophy and commitment to all of our customers. We put that philosophy into action by offering extensive instructor training and strong technical support to help you transform your vision into reality. We support our learning systems throughout their life cycle. Our distributors offer local service and provide on-going support as well.

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## Easy Skill Assessment and Tracking

SkillACE is the perfect teaching assistant, handling much of the administrative burden to allow teachers more time to teach. Easy class setup and reporting combined with computerized testing and authentic skill assessment are key leveraging points for instructors. Define classes anyway you wish – tests, projects, skill assessments, attendance, etc. Reporting is simple with many pre-defined reports and easy import / export capability. Pre-quizzes and quizzes are delivered via the computer with results automatically reported. SkillACE supports authentic assessment, which is critical to creating practical skills students can apply with confidence either in the workplace or in advanced studies. Instructors can enter place assessment results via a PDA or on any student or teacher workstation.

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## Amatrol's CNC Machine Operator Program

### *Flexible Turn-Key Program*

Amatrol's turn-key program includes:

- 130+ Skills
- 80+ Hours of Learning
- 24 Self-Paced Learning Units
- Instructor's Assessment Guide

- On-The-Job Training Guide
- NIMS Certification Package

Learn more about Amatrol's CNC Machine Operator Program

## NIMS Credentials

Skills in the metalworking industry are certified through the earning of NIMS credentials. The credentials are awarded on satisfactory completion of both performance tests and related theory exams.

### **Standards-based Assessments**

The assessments are standards based; i.e., they are drawn from the NIMS national metalworking standards. Both performance and theory assessments are developed by the industry and piloted in the industry.

### **Performance plus Knowledge Examinations**

NIMS certifications require both performance and theory exams. The performance will be the manufacturing of a part, the set-up and operation of a machine or the writing of a program that will manufacture a specific part.

### **Multiple Credentials**

The NIMS standards are modular, thus permitting credentials based on specific metalworking process and levels of competency. For example, there are 11 distinct credentials in Machining Level I. Overall, there are 52 NIMS credentials. The credentials enable the employer to assess candidates in those skills most applicable the firm's needs and enable training institutions to measure program performance tailored to industry's needs.

### **Advantages to Companies**

Metalworking companies use the credentials for recruiting, hiring, placement and promotion. The guesswork is removed from the human resource process. Companies can advertise for specific NIMS credentialed skills, preferring or requiring certain credentials. For example, a North Carolina company requires two NIMS Level I machining programs from all candidates. A Missouri company bases raises on NIMS credentials.

### **Basis for Apprenticeship Training**

The NIMS credentials serve as progress assessments in the industry's exciting, new Competency-Bases Apprenticeship System. The credentials demonstrate the earned competencies required in the new system.

### **Advantages to Education and Training Programs**

Educational institutions use NIMS credentials as performance measures and as the basis for articulation. For example, Pennsylvania requires all machining students to test for NIMS. U.S. Army machinist trainees earn NIMS credentials. The Robert C. Byrd Institute requires NIMS credentials for the earning of the Associate Degree in Manufacturing Technology. An ever-growing number of colleges and universities award credits to high school students and to company employees for NIMS credentials.

### **Advantages to the Workers, Trainees and Students**

The candidates know clearly what is expected of them, whether it is for graduation, hiring or advancement. The NIMS credential clearly demonstrates that the credential holder met the industry benchmark for that competency.

**Where and How**

The company or training institution needs no prior relationship with NIMS for its employees or trainees to earn credentials. The credentials can be earned literally anywhere.

Interstate Renewable Energy Council

<http://www.irecusa.org/standards-development/certificate-programs/>

**ANSI/IREC**

**STANDARD**  
**14732:2014**

General Requirements for the Accreditation of  
Clean Energy Certificate Programs



 **IREC** Interstate Renewable Energy Council, Inc.

[www.irecusa.org](http://www.irecusa.org)

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ANSI/IREC Standard 14732-2014**

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## **1. Scope**

1.1 This standard forms the foundation for the accreditation of certificate-awarding entities that develop and administer credit or non-credit clean energy-related programs offered in formal educational institutions and other legal entities. For the purposes of this standard, clean energy technologies and practices include renewable energy, energy efficiency, distributed renewable energy generation, and other sustainability practices.

1.2 This standard provides the accreditation requirements that clean energy programs must meet and document to earn and maintain accreditation. The purpose of accreditation is to determine whether the program meets the requirements for issuing a market-valued certificate.

1.3 This standard does not address requirements for the certification of individual practitioners, educators, or trainers in clean energy programs.

1.4 Organizations abide by local, state, and federal regulatory requirements. This standard is not intended to supersede any codes, requirements, or regulations.

## **2. Referenced Documents**

At the time of publication of this standard, the following referenced documents are the most current:

ANSI/ASTM E 2659-09E1 Standard Practice for Certificate Programs

ANSI/IACET 1-2013 Standard for Continuing Education and Training

ANSI/ISO/IEC 17011:2004 Conformity Assessment—General Requirements for Accreditation Bodies Accrediting Conformity Assessment Bodies

ANSI/ISO/IEC 17024:2012 Conformity Assessment—General Requirements for Bodies Operating Certification of Persons

Bloom, B.S., Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain, 1956, Longman.

Gelman, R., National Renewable Energy Laboratory, U.S. Department of Energy, Energy Efficiency and Renewable Energy, 2012 Renewable Energy Data Book, October 2013  
DOE/GO-102013-4291

IREC Standard 01023:2013 – General Requirements for the Accreditation of Clean Energy Technology Training

IREC Standard 01024:2013 – General Requirements for the Certification of Clean Energy Technology Instructors and Master Trainers

## **3. Terminology**

This terminology is provided solely for the purposes of this standard, to guide applicant organizations. Several sources were referenced, including: Professional Testing, Inc., ASTM E 2659-09E1 Standard Practice for Certificate Programs, ASTM E 2708-10 Standard Terminology for Personnel Credentialing, and ISO/IEC 17024:2012 Conformity Assessment—General Requirements for Bodies Operating Certification of Persons.

**Accepted Testing Practices**—Practices that experts who develop, maintain, and administer examinations follow to assure the reliability and validity of evaluation instruments. There are several published standards addressing accepted testing practices, including:

- International Standard ISO/IEC 17024:2012 Conformity Assessment—General

Requirements for Bodies Operating Certification of Persons (accreditation standards) administered by the American National Standards Institute (ANSI)

- Principles for the Validation and Use of Personnel Selection Procedures, 4th Edition (2003) published by the Society for Industrial and Organizational Psychology
- Principles of Fairness: An Examination Guide for Credentialing Boards (Council on Licensure, Enforcement and Regulation and National Commission for Certifying Agencies, revised 2002)
- Standards for Education and Psychological Testing (1999) published by the American Educational Research Association, the American Psychological Association and the National Council on Measurement in Education
- Uniform Guidelines of Employee Selection (1978), adopted by the United States Equal Employment Opportunity Commission, Department of Labor and Department of Justice

**Accreditation**—Third-party review and attestation of an entity's conformance with an established standard. Accreditation is awarded for a fixed period of time and requires renewal.

**Certificate**—A document awarded to individuals who meet and successfully complete the certificate program's requirements.

**Certificate-Awarding Entity**—A legal entity that offers education or training culminating in the award of a market-valued certificate.

**Certificate Invalidation**—The nullification of an issued certificate when an individual fails to comply with a certificate program's terms and conditions.

**Certificate Program**—A course, sequence of courses, or learning events focused on an area of specialized knowledge or information with specific learning objectives. The certificate program is developed, supervised, and evaluated by subject-matter experts and culminates in the issuance of a document indicating fulfillment of specific completion requirements.

**Certificate Program Personnel**—Individuals employed, contracted, or volunteering to administer any component of the certificate program, including: instructional design and delivery, evaluation development and administration, student registration, program delivery support and administration, and other key program-related activities and services.

**Criterion-Referenced Standard**—A method of categorizing, through evaluation, the performance of examinees into two groups by comparing their performance to an established standard of competence (pass or fail).

**Criterion-Referenced Scoring Methodology**—A scoring methodology that measures an individual's performance against predetermined competency standards that have been validated by subject-matter experts, rather than against the performance of others. Each evaluation must be validated against the competency standards that it is assessing.

**Curriculum**—Broadly, a plan for the education of learners. This can include a program of studies (e.g., subjects), course content (e.g., topical outlines), planned learning experiences, or a series of learning outcomes. It is typically a written plan.

**Designation**—The title or trademark label applied to achievement of a credential.

**Document Control**—The procedures established in developing, approving, revising, naming, storing, accessing, and disposing of program documents (such as policies, procedures, and records).

**Education/Training Cycle**—The series of steps or stages that comprise a complete education/training program, from admission to issuance of the certificate.

**Energy Efficiency** — The result of efforts to reduce the amount of energy or water consumed in producing a service, product, or condition.

**Generally Accepted Procedures, Processes, or Practices**—Procedures, processes, or practices that have been agreed upon and validated by experts in a discipline and are referenced consistently in professional literature.

**FERPA (Family Educational Rights and Privacy Act of 1974)**—Federal legislation in the United States that protects the privacy of students' personally identifiable information (PII). The act applies to all educational institutions that receive federal funds. It states that parents of students under 18, or eligible students (students over 18 or those who have matriculated to an educational institution above high school), must be allowed to view and propose amendments to their educational records. The act also mandates that schools must obtain written permission from parents or eligible students to release a student's PII.

**Internal Audit**—The review of an entity's policies and procedures to determine the entity's conformance with them. Internal audits include preventive and corrective actions for areas of non-conformance, as well as opportunities for continuous quality improvement.

**Job Task Analysis**—A formal, industry-accepted study, validated by a group of subject-matter experts, that defines competencies in knowledge, skills, and attitudes as the basis for education/training curricula. Similar activities are also referred to as task analyses, practice analyses, and role-delineation studies.

a) **Tasks** are the individual functions, whether mental or physical, necessary to carry out an aspect of a specific job.

b) **Knowledge, Skills, and Attitudes (KSAs)** include the physical and mental capabilities that a practitioner must possess to perform a job competently, ethically, and safely.

**Learner**—A participant in a learning event who acquires knowledge or skills directly or indirectly through the facilitation of a subject-matter expert.

**Learning Objectives**—Measureable and observable statements of learner outcomes. Learning objectives typically have three components: conditions statements, behavior or action, and a performance standard. They are used as guides to develop tests and evaluations.

**Management Review**—The study of internal audit and program evaluation results by program management. This may be followed by the implementation of corrective or preventive actions.

**Management System**—The combination and integration of policies, procedures, and processes by which the certificate program is developed, implemented, maintained, and evaluated.

**Market-Valued Certificate**—Demonstration by the certificate-awarding entity that the issued certificate has value in the market by requiring skills that are in demand by employers and/or achieving recognition by industry, government, or the public that training outcomes result in marketable and job-related skills.

**Passing Score**—The criterion-referenced minimum score a learner must achieve to pass a test or evaluation that is intended to identify those who have achieved the learning objectives.

**Performance Standard**—The criteria component of a learning objective that describes specific performance expectations. It is generally stated in terms of a learner's competence regarding a given task, skill, or area of knowledge.

**Personnel**—(see **Certificate Program Personnel**)

**Prerequisites**—Previously learned knowledge, skills, and abilities that the learner must acquire before new learning can occur. Prerequisites can take the form of individual knowledge and skills, skill sets, and lessons, units of instruction, and courses that have specific learning objectives. These differ from program entry requirements, which are a list of abilities and accomplishments that an individual must have before taking a course. Entry requirements usually take the form of abilities (such as math, language, or kinesthetic aptitudes), work experience (for example, two to three years working as a solar installer apprentice), or education (such as a high school diploma).

**Program Evaluation**—A process whereby the certificate-awarding entity conducts a comprehensive evaluation of the certificate program against stated program performance objectives. It affords stakeholders the opportunity to provide feedback on learner attainment of outcomes, course design, course delivery, quality of instruction, assessment instruments, graduate job placement, facilities, equipment, and administration processes.

**Renewable Energy** —Wind, solar, geothermal, bioenergy, hydrogen, non-conventional hydro, and renewable fuels.

**Stakeholder**—Any individual or group who has a primary interest in, or who may be significantly affected by, the certificate program.

**Subject-Matter Experts (SMEs)**—Qualified personnel who contribute to various aspects of the development and implementation of the certificate program, including the learner evaluations. SMEs are selected based on their extensive knowledge of the content being delivered and the learner outcomes and competencies being evaluated.

**Systematic Program Plan**—Any one of several processes recognized by education and training professionals that documents the creation or revision of educational programs, workshops, or courses using inter-related components of analysis, design, development, implementation, and evaluation.

**Tangible Products**—Student work with multiple critical elements that must be evaluated for compliance to a standard or criterion. Examples include schematics, blueprints, diagrams, system installations, reports, architectural models, renderings, and essays.

**Valid Certificate**—The length of time for which a certificate is considered current, based on how long program content remains relevant.

**Water Conservation**—Activities designed to reduce the demand for water, improve efficiency in use and reduce losses and waste of water, and improve land management practices to conserve water.

#### **4. General Requirements**

The following general requirements establish conditions for submission of an application for accreditation and provide the basis for requirements of the standard.

**4.1 Eligibility for Accreditation:** The certificate-awarding entity shall demonstrate that it has conducted the education/training program in its entirety, at least once, at the time the accreditation application is submitted.

**4.2 Legal Entity:** The certificate-awarding entity shall be a legal entity or part of a legal entity.

**4.3 Organizational Structure:** The certificate-awarding entity shall have an organizational infrastructure that instills confidence on the part of learners and other stakeholders. Certificates shall be issued by an entity that has a designated manager charged with administrative oversight to ensure that the certificate program conforms to all policies, procedures, and administrative processes.

**4.4 Policies and Procedures:** The certificate-awarding entity shall have policies and procedures that guide decisions related to administration of the systematic program plan and the management system.

**4.5 Stakeholder Participation:** The certificate-awarding entity shall provide interested and relevant parties affected by workforce outcomes of the program with opportunities to participate in program development and continuous quality improvement initiatives in a manner that maintains a balance of stakeholder representation and transparency of process.

**4.6 Linkage with Industry:** The certificate-awarding entity shall maintain relationships with the subject industry to ensure the continued currency and market value of the certificate. Industry is defined as entities involved in the technology being taught and may include employers, workforce-development organizations, manufacturers, professional associations, and contractors, among others.

**4.7 Staff Size:** The certificate-awarding entity shall demonstrate it has sufficient personnel to meet program obligations and functions.

**4.8 Commitment to Quality:** The certificate-awarding entity shall have a written process for continuous improvement of program implementation and management. Top management shall ensure that this policy is understood and implemented at all levels of the organization.

#### **5. Requirements for Written Policies and Procedures**

At a minimum, there shall be written policies and procedures to address the following program areas. Policies and procedures must be published and available to interested parties. Policies must comply with applicable regulations or statutory requirements.

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General Requirements

**a) Certificates:** The certificate-awarding entity must have written policies and procedures that provide for the granting and use of certificates and revocation of

certificates. At a minimum, certificate invalidation shall occur if it is found that the certificate holder has not fulfilled the certificate program requirements.

1) Certificates must include the names of the certificate issuer and holder, the title and scope of the certificate program, the date issued, a unique certificate number, the date of expiration (if applicable), and the designation obtained (if applicable). The certificate must be signed or validated by an authorized official.

2) The certificate-awarding entity shall define how the certificate is referred to and what its authorized uses are and communicate this information to certificate holders and other stakeholders.

**b) Complaints and Appeals:** The certificate-awarding entity shall have defined policies and procedures for filing, handling, and resolving complaints and appeals. Due process shall be assured.

**c) Confidentiality:** Except as required in this standard, or by regulations and statutory requirements, the certificate-awarding entity must have written policies and procedures that provide for the confidentiality of information obtained in the course of education/training activities. Information that must be kept confidential includes, but is not limited to, any personally identifiable information of learners and/or applicants.

**d) Conflict of Interest:** The certificate-awarding entity must have clear and documented policies and procedures to ensure that conflicts of interest concerning the certificate program are minimized and managed—or avoided, if possible. Such policies and procedures shall apply to all certificate program personnel.

**e) Internal Audit:** The certificate-awarding entity must have written policies and procedures governing the internal audit process.

**f) Non-Discrimination:** The certificate-awarding entity shall ensure that its practices do not discriminate in admitting candidates, educating or training learners, providing access to resources, or hiring personnel.

**g) Paid Promotions and Undue Influence:** Promotion of products and services to the exclusion of others is prohibited within the delivery of educational content. The program must disclose sponsorship(s) and indicate to learners that other products or services exist in the market. Where any form of outside financial support is provided to the certificate awarding entity, there shall be documentation ensuring that no undue influence on the program has occurred as a result of such financial support.

**h) Record-Keeping and Documentation Systems:** The certificate-awarding entity shall maintain a comprehensive record-keeping and documentation system that details the types of records maintained, parties with access to those records, timeframes for record storage, and procedures for records disposition. At a minimum, the record-keeping and documentation system shall include the following:

- 1) Complaints and appeals
- 2) Confidentiality and privacy
- 3) Internal audits
- 4) Personnel records
- 5) Program evaluation reports
- 6) Relationship to relevant industry
- 7) Stakeholder participation
- 8) Student records

- 9) Systematic program plan
- 10) Financial records
- 11) Certificates issued

**i) Release of Information:** The certificate-awarding entity must have written policies and procedures that provide for the release of information about an applicant or learner that is gained in the course of education/training activities. Information may only be released with the written consent of the subject person, unless otherwise required by applicable law.

**j) Safety and Safe Practices:** The certificate-awarding entity must have and maintain policies and procedures that ensure ongoing safety and safe practices in the delivery of the certificate program.

## **6. Requirements for Personnel**

The certificate-awarding entity shall meet the following requirements for program personnel.

**6.1 Certificate Program Personnel:** The certificate-awarding entity is responsible for and has authority over personnel matters related to the certificate program.

**6.1.1 Sufficient Personnel:** The certificate-awarding entity shall demonstrate it has sufficient and qualified personnel to perform the functions required by the certificate program.

**6.2 Qualifications of Certificate Program Personnel:** The certificate-awarding entity shall define and document the necessary education, training, certification, and/or experience required of personnel who design, develop, implement, and evaluate the program. Qualifications requirements must be reviewed at least annually.

**6.3 Responsibilities of Personnel:** At a minimum, the certificate-awarding entity shall identify personnel responsible for the following key program activities:

- a) Formulating and implementing policies and procedures that guide administration and management of the certificate program
- b) Planning and monitoring for viable financial operation of the certificate program
- c) Designing and implementing the certificate program
- d) Recruiting, monitoring, and evaluating the performance of instructors
- e) Overseeing the roles and responsibilities of volunteers, contractors, and associated committees
- f) Communicating information about the certificate program
- g) Making the decision to issue a certificate

**6.4 Written Job Descriptions:** The certificate-awarding entity shall provide all program-related staff with clearly documented job descriptions that list their duties and responsibilities and identify their supervisors and the personnel that report to them. Written job descriptions shall be reviewed and updated annually to reflect current responsibilities.

**6.5 Evaluation of Employees:** The certificate-awarding entity shall conduct regular performance evaluations of its employees and document the results, including plans for continued professional development.

**6.6 Management of Contracted Services:** The certificate-awarding entity shall identify all providers of contracted services related to key program activities, including: recruitment, promotion, curriculum development, instruction, evaluation, and other services in which contractors have access to sensitive information. The certificate-awarding entity shall maintain full responsibility for all contracted services. At a minimum, a signed agreement of record must be in place that includes provisions for:

- a) Compliance with certificate program policies and procedures
- b) Confidentiality and conflict of interest
- c) Monitoring and evaluating the contractor's work
- d) Protection of intellectual property and ownership of the program

**6.7 Qualifications of Contracted Personnel:** The certificate-awarding entity shall provide evidence that all contracted services are delivered by qualified providers.

### **7. Requirements for Financial Viability**

The certificate-awarding entity must provide evidence of financial resource capability for operating the certificate program, including delivery of the curriculum for all enrolled participants. Evidence should include a financial plan that outlines the projected income and expenses of managing the certificate program.

### **8. Requirements for Certificate Program Application**

The certificate-awarding entity shall require program applicants to submit a signed application form. At a minimum, the application form shall contain:

- a) The scope and requirements of the education/training program
- b) A statement that the applicant agrees to comply with the requirements and directions of the education/training program and to supply any information relevant to safety and medical issues
- c) A description of how the applicant meets the required education and work experience criteria, if applicable, including supporting documentation and prerequisites
- d) Contact information

### **9. Requirements for Management System**

The certificate-awarding entity shall have a documented management system. The management system shall include, at a minimum, the following components: documentation, document control, internal audit, management review, and communication of internal audit results.

**9.1 Documentation:** All policies and procedures of the organization that directly impact the development and administration of the certificate program must be documented.

**9.2 Document Control:** Document control shall include the tracking, management, and use of certificate program documents to ensure system integrity.

**9.3 Internal Audit:** An internal audit shall be planned and conducted, at least annually, or as deemed necessary by the organization. The internal audit report shall document any circumstances of non-compliance with policies and procedures. The internal audit report shall include the reason(s) for non-compliance, and corrective and/or preventive actions to ensure compliance. Results of the internal audit shall be communicated to program management.

**9.4 Management Review:** Program management shall review the results of the internal audit, acknowledge corrective and preventive actions, and ensure that such actions are taken.

## **10. Requirements for Certificate Program**

The following requirements for analysis, design, development, implementation, and evaluation shall be components of the certificate program.

**10.1 Certificate Development:** The certificate-awarding entity shall develop the certificate program in accordance with requirements of the entity's own systematic program plan.

**10.2 Job Task Analysis Basis for Curriculum or Syllabus:** The certificate-awarding entity shall base the certificate program on a current, valid job task analysis (JTA) that has been developed using generally accepted procedures and includes the following:

- a) An objective or scope that defines the overall job, including conditions and criteria
- b) A list of the knowledge, skills, and attitudes (KSAs) that define the job
- c) Criticality ratings for each KSA
- d) Criteria used for validating the JTA

The use of one or more partial JTAs is subject to the same criteria specified above. Entities that use a partial JTA must show how it is connected to a specific, more encompassing job. The KSAs should be listed and rated for criticality, and the JTA should be documented for validity.

**10.2.1 Syllabi or Curricula:** The syllabi and/or curricula, together with stated prerequisites, if any, shall ensure that participating learners receive instruction and practice that is linked to the knowledge and skill competencies as stated in the JTA.

**10.2.2 Availability of Job Task Analysis:** The JTA shall be available upon request as a reference for learners.

**10.3 Systematic Program Plan:** The certificate-awarding entity shall develop and maintain its own systematic program plan using principles of criterion-referenced instruction.

**10.3.1 Documentation of Systematic Program Plan:** The certificate-awarding entity shall document how it has integrated analysis, program design, development, implementation, and evaluation into a systematic program plan.

**10.3.2 Comprehensive Curricula and Syllabi:** The certificate-awarding entity shall have a defined curriculum for each program and a syllabus for each course in the program submitted for accreditation. Instruction shall conform to the curricula and syllabi.

**10.3.3 Curricula and Syllabi Revision and Maintenance:** The certificate-awarding entity shall revise and maintain the curricula and syllabi, including the applicable prerequisites (skills and knowledge) needed for learners to achieve learning objectives. The timing of these revisions (called continuous performance improvement) can be based on whether or not the job changes, changes to the syllabus or testing procedures, the addition or deletion of activities such as labs, or other instructional modifications.

**10.3.4 Utilizing Another Entity's Curricula:** Certificate-awarding entities that use curricula developed by other entities must demonstrate that the curricula meet the requirements of the applicant organization's systematic program plan and that these curricula are revised, maintained, and evaluated in the same way as their own systematic plans.

**10.4 Certificate Issuance:** The certificate-awarding entity shall establish and publish

requirements for issuing a certificate. Such requirements shall be aligned with the program's curricula.

**10.4.1 Minimum Guidelines for Issuance:** Requirements for issuing a certificate shall include minimum guidelines for participation in the program and achievement on evaluations of learning outcomes. Minimum guidelines shall not include the option to test out or in any other way avoid participation in the full program.

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**10.5 Certificate Term:** If the certificate has an expiration date or requirements for renewal, the length of the term and/or the renewal requirements shall be referenced in information for learners and stakeholders.

**10.6 Facilities:** The certificate-awarding entity shall have or have access to facilities in which to conduct education/training.

**10.6.1 Support of the Learner:** The education/training facilities must support the learners' participation in the program and attainment of learning objectives.

**10.6.2 Safety:** Facilities must provide a safe learning environment that supports delivery of the course(s), interaction of learners and instructors, and instructional technology—including proper safety materials and equipment.

**10.6.3 Off-site Facilities:** Certificate-awarding entities conducting education/training off-site or in facilities that they do not own shall assure and attest that such facilities comply with the program's requirements.

**10.7 Tools, Equipment, and Hardware Requirements:** The certificate-awarding entity shall ensure that the necessary tools, equipment, and hardware are available for learners to achieve the specified learning outcomes. This includes, but is not limited to, personal protective equipment, safety materials and equipment, education/training hardware, and tools.

**10.8 Resources:** The certificate-awarding entity shall provide access to library, research materials, and applicable job-placement resources for the learners' reference and use. Services may be provided through various media and may be subcontracted.

**10.9 Delivery of Certificate Program:** The certificate-awarding entity shall deliver a program that meets the following requirements:

- a) The material is presented in an organized learning format
- b) Courses incorporate adult learning principles and practices in delivery of instruction
- c) Assignments and practice exercises are clear and have defined and measurable objectives
- d) Students receive timely and specific feedback regarding their progress in attaining the learning objectives
- e) Where applicable, practice exercises related to the learning objectives are offered. Practice exercises may take the form of group projects, case studies, scenarios, lab activity, practical experiences, and other forms of learner-centered instructional practice.

**10.10 Online Delivery:** If learning is delivered online, requirements for the delivery of the certificate program as outlined in this standard must be met in addition to the following conditions:

- a) Each course or learning event has an identified instructor of record
- b) The provider indicates in advance of the program the hardware and software that are required for the learner to participate
- c) The provider indicates in advance of the program the computer skills that are required for the learner to participate
- d) Navigation is clearly described orally or in writing. If difficulties are encountered during navigation, instructions are given for getting assistance
- e) There is a system in place that tracks and monitors student progress
- f) Learners have a mechanism for contacting the provider with technical and content related questions. Response time related to training questions is stated in the syllabus and adhered to
- g) Contingency strategies are in place to provide a quick recovery from technology related interruptions to complete the education/training in a timely manner

**10.11 Evaluation of Learners:** All courses shall have a summative evaluation to measure attainment of the learning objectives. Each individual student must be evaluated to demonstrate that they have achieved the stated learning objectives. Evaluation of learners may include written examinations, practical examinations, exercises, and group projects. All evaluations shall meet the requirements as set forth in this standard.

**10.11.1 Information to Learners:** Criteria by which learners will be evaluated for a given education/training course or program shall be made available in writing at the outset of the course or program.

**10.12 Written Examinations:** Written examinations designed to evaluate attainment of learning objectives must be administered to each individual student and must be criterion-referenced. Written examinations must follow guidelines for acceptable practices in examination development and administration.

The certificate-awarding entity must have written policies and procedures for developing, maintaining, administering, and scoring written examinations that ensure the following:

**10.12.1 Examination Development and Maintenance:**

- a) Examinations evaluate each individual learner's achievement of the stated learning objectives based on the performance standard (i.e., the criterion). Examination questions shall follow accepted guidelines for specific question types (such as multiple choice or performance)
- b) Examinations are developed in a secure manner (with specific provisions that address the security of examination materials, non-disclosure agreements, and restricted access of examination materials to authorized personnel)
- c) Examinations are routinely reviewed and evaluated for quality, relevance, and accuracy of measurement

**10.12.2 Examination Administration:**

- a) Examinations, including those provided online, are administered to each student in a secure and standardized manner
- b) Examination administration is aligned with the type of examination
- c) Reasonable accommodations are provided for learners with special needs
- d) Examination administrators follow examination administration protocols

**10.12.3 Scoring of Examinations:**

- a) The passing score is determined by a methodology that is criterion-referenced; that is, based on the stated performance standard in the learning objective

- b) Individual learners receive a score that indicates their performance against the stated learning objectives
- c) Processes are in place to ensure consistent scoring (i.e., inter-rater reliability)
- d) Individual learners receive their scores in accordance with published timelines

**10.13 Non-Written Evaluations (Oral Examinations, Performance Examinations, and Tangible Products):** Non-written evaluations designed to assess attainment of learning objectives must be administered to each individual student and must be criterion-referenced.

Non-written evaluations must follow guidelines for acceptable practices for development and administration.

The certificate-awarding entity must have written policies and procedures for developing, maintaining, administering, and scoring non-written evaluations that ensure the following:

**10.13.1 Development and Maintenance of Non-Written Evaluations:**

- a) All evaluations measure each individual learner's achievement of the stated learning objectives based on the performance standard (i.e., the criterion)
- b) Measurement instruments for non-written evaluations (such as criterion referenced checklists, rubrics, and observation instruments) follow accepted guidelines for development
- c) All evaluations are developed in a secure manner (with specific provisions that address the security of evaluation materials, non-disclosure agreements, and restricted access of evaluation materials to authorized personnel)
- d) Evaluations are routinely reviewed for quality, relevance, and accuracy of measurement for continuing quality improvement

**10.13.2 Administration of Non-Written Evaluations:**

- a) All evaluations are administered to each student in a secure and standardized manner
- b) When a physical performance is evaluated, all space and equipment needs are specified and standardized. These requirements are met before any evaluation is administered
- c) Oral examinations are administered privately to each individual
- d) Administration of evaluations is aligned with the type of examination (oral, performance, or tangible product)
- e) Reasonable accommodations are provided for learners with special needs
- f) Examination administrators follow examination administration protocols in accordance with the type of evaluation

**10.13.3 Scoring of Non-Written Evaluations:**

- a) The passing score is determined by a methodology that is criterion-referenced; that is, based on the stated performance standard
- b) A scoring rubric, checklist, or observation instrument is used in accordance with the type of evaluation
- c) Checklist items and items in other observation instruments have specific criteria for evaluation (such as yes/no, pass/fail, or behaviorally anchored rating categories)
- d) Checklists and other observation instruments include specific stated criteria for mastery of the task, skill, or knowledge
- e) Individual learners receive a score that indicates their performance against the

stated learning objectives

f) Processes are in place to ensure consistent scoring (i.e., inter-rater reliability)

g) Individual learners receive their scores in accordance with published timelines

**10.14 Awarding Credits:** If academic or continuing education credit is awarded as part of the certificate program, there shall be a consistent and documented method by which such credits are awarded. Information about the amount and type of credits awarded and the requirements for earning credits shall be communicated to all stakeholders.

**10.14.1 Use of Another Entity's Credit-Awarding System:** If the certificate-awarding entity chooses to use another entity's credit-awarding system, it must adhere to the requirements of that system.

**10.15 Evaluation of Program Effectiveness:** As part of the systematic program plan, the certificate-awarding entity shall conduct an ongoing evaluation of program effectiveness, with an emphasis on learner attainment of outcomes, course design, delivery, quality of instruction, examination instruments, graduate job placement, facilities, equipment, and administration processes.

**10.15.1 Comprehensive Program Evaluations:** The certificate-awarding entity shall develop, implement, and maintain an evaluation process that allows all program participants to provide feedback on all aspects of the program.

**10.15.2 Results of Performance Data:** The comprehensive evaluation shall include results of performance data related to the learners' attainment of learning outcomes, and these data shall be used to make modifications or revisions to the course and/or program.

**10.15.3 Record of Evaluations:** The results of evaluations shall be documented in a comprehensive manner at least annually and become part of the official record of the program. The comprehensive evaluations shall be part of the entity's provisions for continuous improvement.

## **11. Requirements for Information about the Certificate Program**

The certificate-awarding entity shall publish and make available relevant program information.

**11.1 Communicating Use of Certificate:** The certificate-awarding entity shall communicate to certificate holders and other stakeholders authorized use of the certificate and its designation, if applicable.

**11.2 Informational Materials:** The certificate-awarding entity shall publish and define uses of the certificate in the marketplace. It shall not state or suggest that certificate holders are certified, licensed, registered, or accredited, or suggest that successful completion of the certificate program will guarantee a job for the certificate holder.

**11.3 Information Provided to Learners and Stakeholders:** At a minimum, the certificate awarding entity shall provide applicants, learners, and stakeholders with an accurate, current, detailed description of the following:

a) The scope of the certificate program, including: the current job task analysis, desired outcomes, curricular content, learning objectives, and evaluation methodologies

b) A description of prerequisites and program requisites, including: fees, additional charges for instructional materials, tools, and protective equipment

- c) The skill sets that certificate holders would expect to gain and examples of the types of jobs for which they might apply upon successful completion of the program
- d) Relevant program policies (such as deadlines, cancellation and refund policies, appeals and due process)
- e) The terms of awarding academic or continuing education credits
- f) Changes to the program and effective dates

## National Board of Certified Energy Practitioners

<http://www.nabcep.org/about-us>

# NABCEP™

Raising Standards. Promoting Confidence.

## About Us

### About NABCEP

NABCEP was founded in 2002 as a non-profit 501 (c)(6) corporation with a mission “to support, and work with, the renewable energy and energy efficiency industries, professionals, and stakeholders to develop and implement quality credentialing and certification programs for practitioners.” The first NABCEP Solar PV Installer certification exam (now called PV Installation Professional) was administered in 2003. The Solar Heating Installer certification was first administered in 2006 and the PV Technical Sales Professional was launched in 2011. NABCEP has been running Entry Level examinations since 2006 and the Company Accreditation Program started in 2012.

NABCEP is committed to providing a certification program of quality and integrity for the professionals and the consumers/public it is designed to serve. NABCEP’s programs are administered to the highest standards for certifications and testing. The NABCEP PV Installation Professional and Solar Heating Installer Certifications are accredited to the ISO/IEC 17024 standard by the American National Standards Institute (ANSI). NABCEP understands the importance of impartiality in carrying out its certification activities. NABCEP treats all applicants, candidates, and certificants fairly and impartially by following the policies and procedures outlined in our [Certification Handbook](#). The organization maintains policies and procedures designed to manage conflict of interests and ensure objectivity throughout the certification process.

NABCEP’s goal is to develop voluntary national certification programs that will:

- Promote renewable energy
- Provide value to Solar Installation and Sales Professionals
- Promote worker safety and skill
- Promote consumer confidence

Professionals who choose to become certified demonstrate their competence in the field and their commitment to upholding high standards of ethical and professional practice. If you have an ethical complaint against a NABCEP Certified individual please view the [Ethics Procedures](#).

If you have an operational or policy complaint, objection, dispute, grievance, disagreement or similar matter, please view the [NABCEP Grievance Policy](#). This policy will apply to any grievance matter concerning an action, policy or practice of the NABCEP as a corporate body; NABCEP candidates or certificants; the NABCEP Board of Directors

and Officers; NABCEP executive management and staff; NABCEP Committee members; and NABCEP volunteers and representatives acting on behalf of the NABCEP (parties).

### **Non-endorsement and Disclaimer Statement**

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