Correlation of

Industrial Maintenance and Mechatronics,

Shawn A. Ballee and Gary R. Shearer

Goodheart-Willcox Publisher ©2024

to

NIMS (National Institute for Metalworking Skills)

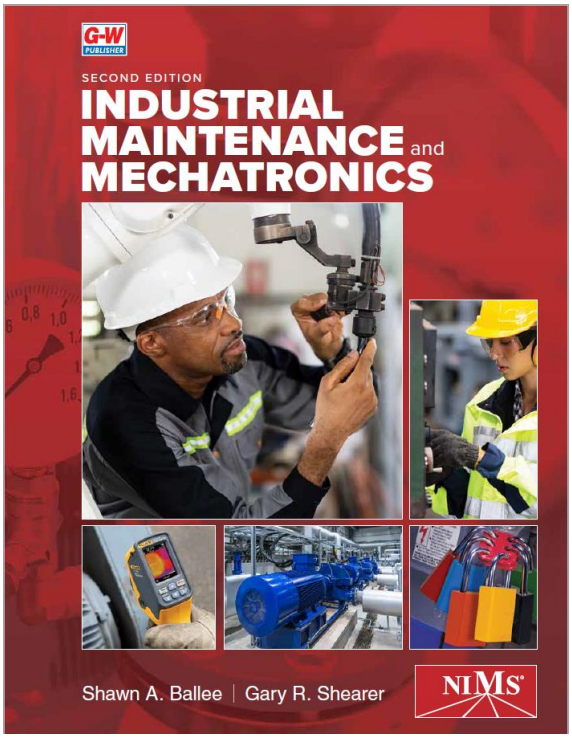
Smart Standard:

Electronic Control Systems Specialist

Industrial Maintenance and Mechatronics carries NIMS' exclusive endorsement and supports attainment of NIMS credentialing in Industrial Technology Maintenance (ITM).

The textbook is designed to work hand-in-glove with the NIMS Smart Standards for Industrial Technology Maintenance. The standards-based learning package will help students pass the testing and performance requirements for NIMS credentialing.

The correlation below lists the knowledge and performance requirements for a specific NIMS Smart ITM Credential. The ITM areas covered in *Industrial Maintenance and Mechatronics* include Maintenance Operations, Mechanical Systems, Hydraulic Systems, Pneumatic Systems, Electrical Systems, Electronic Control Systems, Process Control Systems, and Maintenance Piping.



Standards	G-W Content
Knowledge Area: Safety	
Roles and Responsibilities	Textbook: pg. 16, 17, 18 Lab Workbook: Activity
Bloodborne Pathogens	Textbook: pg. 24–25
OSHA, NIOSH, EPA Safety Requirements	Textbook: pg. 24–25, 44
Fire Prevention/Suppression	Textbook: pg. 25, 28, 42–43
Hazardous Material Identification System (HMIS)	Textbook: pg. 27

Standards	G-W Content
Industrial Hazards: Ergonomics Lasers NFPA Arc Flash Confined Spaces Gases and Combustibles Steam and Compressed Air	Textbook: pg. 24–27, 29, 32, 35, 39–41, 43, 424 Textbook: pg. 26 Textbook: pg. 31 Textbook: pg. 32, 35, 40, 41 Textbook: pg.37–39 Textbook: pg. 42–43, 424 Textbook: pg. 146
Fall Protection Equipment	Textbook: pg. 36–37
Personal Protective Equipment (PPE)	Textbook: pg. 32–36, 44 Lab Workbook: Activity 2-2, Personal Protective Equipment
Safety Data Sheets (SDS)	Textbook: pg. 24–27
Lock Out/Tag Out	Textbook: pg. 28–32 Lab Workbook: Activity 2-1, Lockout/Tagout Procedure
Fuel Sources and Extinguishers	Textbook: pg. 42–43
Material Handling	Textbook pg. 18, 25
Job Safety Analysis	Textbook pg. 43 Lab Workbook: Activity 2-3, Job Safety Analysis
Knowledge Area: Applied Math	
Arithmetic	Textbook: pg. 924–942
Coordinate Systems	Textbook: pg. 450-451, 496, 505, 762
Unit of Measurement Conversions	Textbook: pg. 349–350, 445, 475, 507
Pythagorean Theorem	Textbook: pg. 507–508, 512, 937–939
Right Angle Trigonometry	Textbook: pg. 937–939
Power Flow Calculations	Textbook: pg. 192–193, 518, 554
Knowledge Area: Technical Documents	
Schematics and Diagrams: Power Electrical Control Ladder Logic	Textbook: pg. 126, 671–673 Textbook: pg. 130 Textbook: pg. 126, 620, 877 Textbook: pg. 129, 620–622, 758, 877 Lab Workbook: Activity 6-3, Electrical Diagrams Lab Workbook: Activity 18-2, Basic Pneumatic Circuits 1 Lab Workbook: Activity 18-3, Basic Pneumatic Circuits 2

Standards	G-W Content
Knowledge Area: Measuring and Test Equipment	
Terminology and Definitions	Textbook: pg. 79–80, 447–450, 674 Lab Workbook: Activity 4-2, Vernier Measurements Lab Workbook: Activity 4-3, Micrometer Measurements Lab Workbook: Activity 20-1, Basic Digital Micrometer Measurements
(Types of) Measuring Instruments	Textbook: pg. 79–80, 117, 457
Environmental Influences	Textbook: pg. 243, 448, 526
Documentation and Traceability	Textbook: pg. 143-144, 456
Knowledge Area: Computer Operations	
Organizing and Managing Files	Textbook: pg. 56
Digital File Types (e.g., txt, docx, xlsx)	Textbook: pg. 56
File Naming Conventions	Textbook: pg. 56
Digital Storage Methods (e.g., local, network, cloud)	Textbook: pg. 54, 56
Copy and Paste Functions	Textbook: pg. 56
Knowledge Area: Software Technologies	
Management System (CMMS)	Textbook: pg. 56
Fundamentals of: PLC Program Editors PLC Networks Human Machine Interfaces Hardware and System Requirements Digital File Types	 Textbook: pg. 759 Textbook: pg. 749, 776 Textbook: pg. 781–786 Textbook: pg. 781, 787 Textbook: pg.56 Lab Workbook: Activity 34-1, Basic PLC Setup and Programming Lab Workbook: Activity 34-3, PLC Timer Programming Lab Workbook: Activity 34-4, PLC Counter Instructions Lab Workbook: Activity 34-5, PLC System Control Lab Workbook: Activity 35-1, Connecting HMI to PLC Lab Workbook: Activity, 35-2, Programming Multiple Screens on HMI Lab Workbook: Activity 35-3, PLC Set Points and HMI Troubleshooting

Standards	G-W Content
Performance Duty: Maintenance	
Adjusting:	
Sensors	Textbook: pg. 291, 720–727
Signal Conditioners	Textbook: pg. 720, 807–808
AC Variable Frequency Drives Settings	Textbook: pg. 730–731 Lab Workbook: Activity 33-1, Capacitive, Inductive, Hall Effect, and Magnetic Reed Sensors Lab Workbook: Activity 33-2, Photoelectric Sensors Lab Workbook: Activity 33-3, Wiring and Programming a VFD Lab Workbook: Activity 33-4, Adjusting VFD Parameters
Installing:	
AC Variable Frequency Drives	Textbook: pg. 730–731
Linear and Switching DC Power Supplies	Textbook: pg. 688, 695–696, 757
Sensors and Signal Conditioners	Textbook: pg. 720, 722 Lab Workbook: Activity 31-1, DC Power Supplies
Performance Duty: Troubleshooting	
Exercising Equipment	Textbook: pg. 142–143 Lab Workbook: Activity 25-3, Troubleshooting Transformers Lab Workbook: Activity 38-1, Calibrating a Pneumatic Thermostat Lab Workbook: Activity 38-3, Boiler/Hydronic Heating Units
Checking Inputs and Outputs	Textbook: pg. 413, 751–756, 765–767 Lab Workbook: Activity 34-2, Basic PLC Troubleshooting
Documenting Findings	Textbook: pg. 145–146, 152–154, 666
Performance Duty: Planning	
Documenting Maintenance Procedures	Textbook: pg. 56, 143 Lab Workbook: Activity 3-1, Maintenance Planning
Performance Duty: Improvements	
Researching New Technologies	Textbook: pg. 6, 292
Documenting and Presenting Proposed Changes	Textbook: pg. 8, 15, 43, 60, 64, 727
Performance Duty: PLC	

Standards	G-W Content
Writing PLC Programs	Textbook: pg. 668–669, 759–764 Lab Workbook: Activity 34-1, Basic PLC Setup and Programming Lab Workbook: Activity 34-3, PLC Timer Programming
Editing Existing PLC Programs	Textbook: pg. 749, 750, 759 Lab Workbook: Activity 35-3, PLC Set Points and HMI Troubleshooting
Connecting and Configuring Interfaces and Components	Textbook: pg. 748–749, 757, 759, 766 Lab Workbook: Activity 34-1, Basic PLC Setup and Programming
Transferring Programs to Controllers	Textbook: pg. 735, 736, 737, 739, 748, 749,750, 751, 776
Performance Duty: Standardizing	
Taking Measurements in Accordance with Standardization Procedure	Textbook: pg. 456
Cleaning and Adjusting M&TE	Textbook: pg. 148, 151–152, 439, 451
Performance Duty: Measurements	
Taking Measurements	Textbook: pg. 80, 151–152, 439, 443–456, 674–677 Lab Workbook: Activity 4-1, Using a Machinist's Rule Lab Workbook: Activity 4-2, Vernier Measurements Lab Workbook: Activity 4-3, Micrometer Measurements Lab Workbook: Activity 11-1, Micrometer Use Lab Workbook: Activity 20-1, Basic Digital Micrometer Measurements
Recording Results of Measurements	Textbook: pg. 51, 61, 151, 303 Lab Workbook: Activity 4-1, Using a Machinist's Rule Lab Workbook: Activity 4-2, Vernier Measurements Lab Workbook: Activity 4-3, Micrometer Measurements Lab Workbook: Activity 11-1, Micrometer Use Lab Workbook: Activity 20-1, Basic Digital Micrometer Measurements