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Commercial Workforce Credentialing Council

Building Operations Journey-worker
Content Outline and Behavioral/Learning Objectives

Introduction

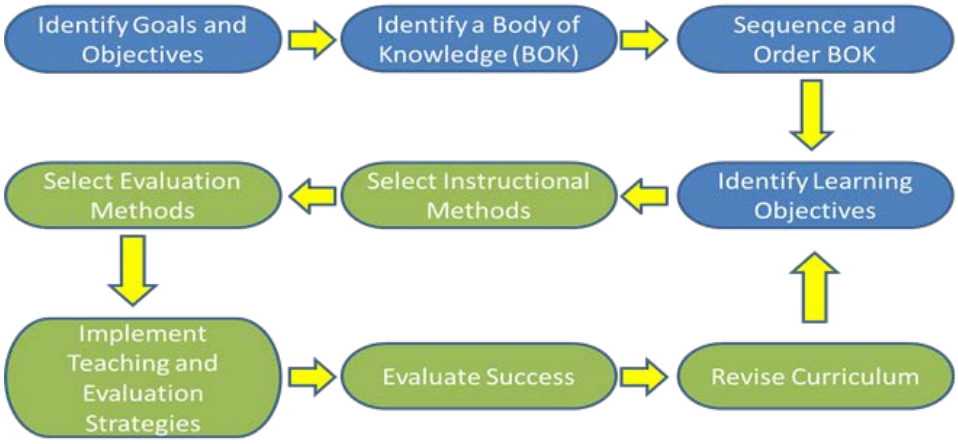
A Building Operations Journey-worker maintains and operates building systems and installed equipment, and performs general maintenance to maintain the building's operability, optimize building performance, and ensure the comfort, productivity and safety of the building occupants. The Building Operations Journey-worker may provide leadership and training to less senior personnel.

The major tasks of a Building Operations Journey-worker are to:

- Operate Buildings
- Optimize the Facility
- Conduct Planning Activities
- Conduct Budgeting Activities

Curriculum Design

The process used to define the components to be included in an educational/training program for Building Operations Journey-worker includes the stages as depicted in the following graphic:



The goals and objectives of an educational/training program must first be defined. For purposes of this program, the goals and objectives of the educational/training program are as follows:

- To prepare an individual to work as an entry level Building Operations Journey-worker

- To provide basic building operations foundational knowledge to allow an individual to function sufficient to obtain the experience required to meet eligibility requirements for obtaining a job and subsequent professional credential as a Building Operations Journey-worker.

Then a body of knowledge must be identified. In the case of Building Operations Journey-worker the body of knowledge was identified through a job/task analysis. The body of knowledge was then sequenced and ordered to facilitate instruction of the content.

Curriculum

Following is a proposed curriculum. This curriculum is designed to cover all content for which a Building Operations Journey-worker should be proficient. However not all content may be taught in a single course. For example some of the content may be part of other building construction programs. To use the course outline, community colleges and vocational institutions are recommended to review existing courses to identify content that may already be incorporated in existing courses. Then a course should be developed only to cover the remaining content not covered in existing courses. Instructional design experts and instructional staff would then select the learning activities to ensure the student learns the content including:

- Selection of textbooks and other appropriate course materials
- Creation of learning activities (lectures, handouts, performance activities, etc.)
- Creation of assessment and evaluation activities to verify learning
- Creation of curriculum evaluation activities

Course Outline

I. Building Systems and Sciences
   a. Air compressor and distribution systems
   b. Air distribution systems
   c. Building automation systems
   d. Building control systems
   e. Building envelope
   f. Chilled water systems
   g. Combined heat and power systems
   h. Communication systems
   i. Condenser water systems
   j. Conveyance systems
   k. Cooling generation equipment
   l. District energy systems
   m. Domestic hot water systems
   n. Electrical power systems
   o. Elevator/escalator systems
   p. Emergency alert systems
   q. Energy metering and monitoring systems

r. Energy recovery systems
s. Fresh air systems
t. Fuel storage and distribution systems (USTs, ASTs, etc.)
u. Heat generation equipments
v. HVAC control systems
w. HVACR systems
x. Irrigation equipment
y. Life safety systems
z. Lighting control systems
aa. Lighting systems
bb. Onsite energy generation systems (CHP, PV, Wind, Thermal, generators, etc.)
cc. Potable cold water systems
dd. Primary sewer/gray water systems
ee. Process systems and controls
ff. Pumps and pumping systems
gg. Renewable energy systems
hh. Specialty exhaust systems
ii. Standpipe/sprinkler systems
jj. Steam and hot water systems
kk. Steam distribution systems
ll. Thermal energy storage systems
mm. Uninterruptible power systems (UPSs)/Building Energy Storage Systems (BSS)
nn. Variable drive systems
oo. Water distribution and control systems

II. Building Operations – Normal Operations
a. Tenants/Occupant Management and Relations
b. Building Operations Risk Management
c. Regular Operational Inspections (elevators, etc.)
d. Special Tenant/Occupant Requests and Issues
e. Equipment Checking
f. Facility Operations (Normal Conditions)
g. Work Orders and Work Order Processes
h. Indoor Air Environmental Quality
i. Consumable Management
j. Energy Management

III. Building Operations – Emergency Situations
a. Emergency Drills
b. Workplace Hazard Assessment
c. PPE Requirements and Program
d. Building Emergencies
e. Inclement Weather Conditions/Issues
f. Facility Operations (other than Normal Operations)

IV. Facility Maintenance and Repair

a. Energy Maintenance and Repair
b. Preventative/Predictive Maintenance
c. Scheduled Maintenance and Repairs
d. Life Safety System Maintenance and Repairs
e. Test Emergency Power Systems and Repair
f. Plumbing System Maintenance and Repairs
g. Water/Wastewater System Maintenance and Repairs
h. Irrigation System Maintenance and Repairs
i. Security System Maintenance and Repairs
j. Building Envelope Maintenance and Repairs
k. Electrical System Maintenance and Repairs
l. Lighting System Maintenance and Repairs
m. Mechanical System Maintenance and Repairs
n. Non-Facility Equipment Maintenance (food service, laundry, etc.) and Repairs
o. Elevator/Escalator Maintenance and Repairs
p. Access System Maintenance and Repairs
q. Communication System Maintenance and Repairs
r. Structural Support System Inspections and Repairs
s. Medical and Laboratory Gas System Maintenance and Repairs
t. Wall and Finish (paint, drywall, etc.) System Maintenance and Repairs
u. Firewall Penetration Integrity Maintenance and Repairs
v. Storm Drainage System Maintenance and Repairs
w. Landscaping Maintenance and Repairs
x. Air Compressor and Compressed Air System Maintenance and Repairs
y. HVACR System Maintenance and Repairs
z. Building Control System Maintenance (BAS, DDC, EMS, BMS, etc.) and Repairs
aa. Hot Water and Steam System Maintenance and Repairs
bb. Utility Submetering System Maintenance and Repairs
cc. Onsite Power Generation System Maintenance and Repairs
dd. Primary Sewer and Gray Water System Maintenance and Repairs
ee. Manage Other Facility Use Systems (package tracking, etc.)
ff. Pest Management
gg. Building Improvement Management
hh. Cleaning and Housekeeping Management
ii. Tenant Improvement Management

IV. Facility Operations Documents and Data

a. Procedural Documentation (SOPs, BOPs, Operating Plans, Emergency Plans, etc.)
b. Equipment Operating Plans
c. Planned Maintenance Schedules
d. Facility Operations Budgets and Budgeting
e. Construction Standards and Guidelines
f. Capital Renewal Plans
g. Asset Inventories
h. Logs
i. As-Built Plans

j. OEMs
k. Inspection Records
l. Data Retention Policies
m. Manage Data (data capabilities and needs, offsite data storage, interoperability levels, data access levels, etc.)

V. Building Optimization

a. Measurement and Verification
b. Analyzing System Performance
c. Reducing Energy Costs
d. Optimize System Performance
e. Sustainability Opportunities

VI. Building Operations Tools

a. Software
    1. Computerized maintenance management system (CMMS)
    2. BIM Viewer
    3. Building energy modeling software
    4. CAD Viewer
    5. Computer aided facility management (CAFM)
    6. ECAM (Energy Charting and Metrics)
    7. Energy Star Portfolio manager
    8. eQuest
    9. FEMP BLCC (Federal Energy Management Program, Building Life Cycle Costing)
    10. Geospatial information systems (GIS)
    11. Integrated work management system (IWMS)
    12. MotorMaster
    13. Spreadsheets
b. Use of Hand Tools
    1. Adjustable pliers
    2. Adjustable wrench
    3. Allen wrenches
    4. Amp Probe
    5. Ball-peen hammer
    6. Chisel
    7. Clamps
    8. Cleaning brushes
    9. Combination wrenches
    10. Deburring tool
    11. Extension magnet
    12. File
    13. Flashlight
    14. Fuse puller
    15. Hacksaw
    16. Hammers
    17. Inspection mirror

18. Locking pliers
19. Lock-out/Tag-out equipment
20. Measuring devices
21. Multimeter
22. Nut drivers
23. Pipe wrenches
24. Pliers
25. Pocket knife
26. Pocket level
27. Ratchets
28. Rubber mallet
29. Screw drivers
30. Small power tools (hand electric drill)
31. Socket sets
32. Strap wrench
33. Tape measure
34. Toilet plunger
35. Torque wrench
36. Tube bender
37. Tubing cutters
38. Vises
39. Water key

c. Personal Protective Equipment
    1. Arc flash protection (NFPA 70e)
    2. Back protection
    3. Dust masks
    4. Eye protection/safety glasses
    5. Face shield
    6. Fall protection
    7. Gloves
    8. Hardhat
    9. Hearing protection (plugs and muffs)
    10. Level C Suit (Tyvek, etc.)
    11. Respirator
    12. Rubber boots
    13. Safety harnesses
    14. Vests
    15. Welding jacket
    16. Work shoes (toe and shank protection)

d. Specialized Tools
    1. Anemometer
    2. Borescope
    3. Circuit tracer
    4. Combustion analyzing instruments
    5. Digital thermometer (surface and air)
    6. Dosimeter
    7. Flow meters

8. Gas Analyzers
9. Hydrometer
10. Infrared thermometer
11. Light meters
12. Manometer
13. Megohmmeter
14. Moisture meter
15. Plumbing snakes
16. Power analyzer
17. Psychrometers
18. Refractometer
19. Refrigeration tools
20. RPM Meter
21. Shaft alignment tools
22. Smoke stick
23. Sound meters
24. Tachometers
25. Temperature meters
26. Thermal imaging camera
27. Torch
28. Tube brushing machines
29. Velometer
30. Vibration analysis instrument

e. Technology Tools
    1. Smart phone with:
        i. Camera
        ii. Wi-Fi access
        iii. Internet access
        iv. Two-way communications
        v. Video recording/transmitting
    2. Computer with:
        i. Spreadsheet applications
        ii. Internet access
        iii. Word processing applications
        iv. Data storage
        v. Graphics software
        vi. External data storage/backup
    3. Data gathering:
        i. Data loggers with sensors (t/h/kw/on-off)
        ii. Utility tariffs
        iii. Real time pricing data stream
        iv. DDC
        v. BEMS/BIMS

Learning Objectives

The following learning objectives are identified as the desired outcome of instruction. These objectives should be reviewed and sequenced according to like objectives by subject matter experts familiar with the content.

1. Upon completion of the course, the student will be able to perform a workplace hazard assessment
2. Upon completion of the course, the student will be able to conduct a building inspection associated with building operations
3. Upon completion of the course, the student will be able to describe the types of building inspections that should be conducted daily, monthly, and quarterly
4. Upon completion of the course, the student will be able to identify confined workspaces
5. Upon completion of the course, the student will be able to identify hazardous building components
6. Upon completion of the course, the student will be able to analyze workplace injury records
7. Upon completion of the course, the student will be able to identify workplace biohazards and chemicals
8. Upon completion of the course, the student will be able to identify building obsolescence
9. Upon completion of the course, the student will be able to create job hazard analyses reports
10. Upon completion of the course, the student will be able to identify PPE required for specific situations
11. Upon completion of the course, the student will be able to demonstrate knowledge of biohazards and hazardous chemicals
12. Upon completion of the course, the student will be able to describe what a chain of custody means
13. Upon completion of the course, the student will be able to describe the limitations of PPE
14. Upon completion of the course, the student will be able to demonstrate knowledge of safety codes and standards (including OSHA)
15. Upon completion of the course, the student will be able to describe typical safety practices
16. Upon completion of the course, the student will be able to conduct emergency drills
17. Upon completion of the course, the student will be able to manage fire drills
18. Upon completion of the course, the student will be able to manage emergency evacuation drills (earthquakes, fires, etc.)
19. Upon completion of the course, the student will be able to develop EAPs (Emergency Action Plans)
20. Upon completion of the course, the student will be able to describe how to monitor fire panels
21. Upon completion of the course, the student will be able to describe how to monitor emergency generators
22. Upon completion of the course, the student will be able to track and record building evacuation times

23. Upon completion of the course, the student will be able to create building evacuation results reports
24. Upon completion of the course, the student will be able to describe how to deal with building tenants/occupants with disabilities and needing assistance in evacuating
25. Upon completion of the course, the student will be able to develop communication protocol (ICS)
26. Upon completion of the course, the student will be able to describe best practices for emergency drills
27. Upon completion of the course, the student will be able to describe the conditions under which a building should be evacuated
28. Upon completion of the course, the student will demonstrate knowledge of emergency procedures including first aid and CPR
29. Upon completion of the course, the student will demonstrate knowledge of first response mitigation techniques such as fire extinguishers
30. Upon completion of the course, the student will demonstrate knowledge of incident command systems (ICS) and national incident management systems (NIMS)
31. Upon completion of the course, the student will demonstrate knowledge of typical evacuation procedures for various occupancy types
32. Upon completion of the course, the student will demonstrate knowledge of specialized emergency equipment
33. Upon completion of the course, the student will be able to manage a PPE program
34. Upon completion of the course, the student will be able to identify hazards in a facility/building
35. Upon completion of the course, the student will be able to train staff on hazards and PPE requirements
36. Upon completion of the course, the student will be able to train staff on limitations of PPE
37. Upon completion of the course, the student will be able to identify how to label hazards and rooms with hazards
38. Upon completion of the course, the student will be able to test staff on use of PPE for correct usage
39. Upon completion of the course, the student will be able to set up medical evaluations for some PPE (Respirators, etc.)
40. Upon completion of the course, the student will be able to conduct a fit test of PPE
41. Upon completion of the course, the student will be able to describe how to document training on PPE
42. Upon completion of the course, the student will be able to describe how to document use compliance for PPE
43. Upon completion of the course, the student will be able to describe how to document PPE testing
44. Upon completion of the course, the student will be able to describe how to procure required PPE

45. Upon completion of the course, the student will be able to conduct audiometric testing (loudness)
46. Upon completion of the course, the student will be able to describe how to enforce use of PPE
47. Upon completion of the course, the student will be able to certify the PPE equipment on an annual basis
48. Upon completion of the course, the student will be able to document a PPE program
49. Upon completion of the course, the student will demonstrate knowledge of decontamination requirements
50. Upon completion of the course, the student will demonstrate knowledge of hazards management
51. Upon completion of the course, the student will demonstrate knowledge of HIPAA requirements
52. Upon completion of the course, the student will demonstrate knowledge of proper procedures for isolating and removing hazards
53. Upon completion of the course, the student will demonstrate knowledge of proper usage of PPE
54. Upon completion of the course, the student will demonstrate knowledge of proper maintenance of PPE
55. Upon completion of the course, the student will be able to determine types of inspections needed in a given facility/building
56. Upon completion of the course, the student will be able to describe how to schedule third party inspections
57. Upon completion of the course, the student will be able to prepare equipment for inspections (shut down, etc.)
58. Upon completion of the course, the student will be able to operate equipment for inspections (elevator recall, etc.)
59. Upon completion of the course, the student will be able to describe ways to participate in inspections (escort the inspector, etc.)
60. Upon completion of the course, the student will be able to describe how to schedule inspections with internal staff affected
61. Upon completion of the course, the student will be able to verify safety for inspectors (hazards, etc.)
62. Upon completion of the course, the student will be able to describe how to communicate with building tenants regarding inspection requirements
63. Upon completion of the course, the student will be able to describe how to communicate results with parties
64. Upon completion of the course, the student will be able to analyze the results of inspections
65. Upon completion of the course, the student will be able to address deficiencies identified during inspections
66. Upon completion of the course, the student will be able to coordinate re-inspections

67. Upon completion of the course, the student will demonstrate knowledge of typical authorizes having jurisdiction
68. Upon completion of the course, the student will demonstrate knowledge of inspection agencies
69. Upon completion of the course, the student will demonstrate knowledge of inspection procedures
70. Upon completion of the course, the student will demonstrate knowledge of the operational impact of inspections
71. Upon completion of the course, the student will be able to identify emergencies
72. Upon completion of the course, the student will be able to initiate emergency procedures
73. Upon completion of the course, the student will be able to describe how to communicate emergency information with internal stakeholders and staff
74. Upon completion of the course, the student will be able to describe how to secure impacted equipment and/or affected areas during an emergency
75. Upon completion of the course, the student will be able to respond to emergencies with no established procedures by isolating and mitigating the emergency
76. Upon completion of the course, the student will be able to describe how to escalate for additional emergency support during an emergency
77. Upon completion of the course, the student will be able to describe how to communicate with external stakeholders
78. Upon completion of the course, the student will be able to describe how to clean up after emergencies
79. Upon completion of the course, the student will be able to conduct "lessons learned" activities after an emergency
80. Upon completion of the course, the student will be able to document emergencies
81. Upon completion of the course, the student will be able to restock emergency supplies
82. Upon completion of the course, the student will be able to make emergency/temporary repairs to stabilize problems
83. Upon completion of the course, the student will be able to make permanent repairs after an emergency
84. Upon completion of the course, the student will be able to conduct root cause analyses of an emergency
85. Upon completion of the course, the student will be able to coordinate outside special services during an emergency
86. Upon completion of the course, the student will be able to describe how to plan for/accommodate non-English speaking building tenants/occupants and staff during an emergency
87. Upon completion of the course, the student will demonstrate knowledge of hazard remediation and clean up
88. Upon completion of the course, the student will demonstrate knowledge of hazardous materials disposal

89. Upon completion of the course, the student will demonstrate knowledge of potential environmental health and safety (EHS) hazards and risks
90. Upon completion of the course, the student will demonstrate knowledge of reporting requirements for emergencies
91. Upon completion of the course, the student will demonstrate knowledge of uninterruptable and critical systems during an emergency
92. Upon completion of the course, the student will be able to describe standard operating procedures associated with Building Operations including (SOPs, BOPs, operating plans, emergency plans, etc.)
93. Upon completion of the course, the student will be able to evaluate building use changes
94. Upon completion of the course, the student will be able to conduct gap analyses to determine needs for additional operating procedures
95. Upon completion of the course, the student will be able to create and document procedures for building operations
96. Upon completion of the course, the student will be able to update and test new/revised procedures for building operations
97. Upon completion of the course, the student will be able to implement revised procedures for building operations
98. Upon completion of the course, the student will be able to train staff on new/revised procedures for building operations
99. Upon completion of the course, the student will be able to evaluate the success of new/revised procedures for building operations
100. Upon completion of the course, the student will be able to update emergency operating procedures
101. Upon completion of the course, the student will be able to update disaster recovery plans
102. Upon completion of the course, the student will be able to demonstrate knowledge of the National Incident Management System (NIMS)
103. Upon completion of the course, the student will be able to develop equipment operations plans
104. Upon completion of the course, the student will be able to determine required equipment start/stop times based on tenant occupancies
105. Upon completion of the course, the student will be able to extract equipment specific information from O&M manuals
106. Upon completion of the course, the student will be able to develop operation procedures (steps in operation) for specific systems and equipment
107. Upon completion of the course, the student will be able to train staff on system operations
108. Upon completion of the course, the student will be able to develop equipment operating logs
109. Upon completion of the course, the student will be able to demonstrate general knowledge of all of the different types of equipment under the responsibility of a building operations professional

110. Upon completion of the course, the student will be able to develop planned maintenance schedules
111. Upon completion of the course, the student will be able to create equipment inventories
112. Upon completion of the course, the student will be able to identify equipment specifications for equipment in a facility/building
113. Upon completion of the course, the student will be able to identify O&M requirements for equipment in a facility/building
114. Upon completion of the course, the student will be able to rank the equipment in a facility/building terms of priority for that facility/building
115. Upon completion of the course, the student will be able to determine the level of service to be performed on equipment based on criticality of the system to the facility/building
116. Upon completion of the course, the student will be able to identify equipment maintenance tasks to be outsourced to third party vendors
117. Upon completion of the course, the student will be able to identify skill level of staff for repairing and maintaining equipment in a facility/building
118. Upon completion of the course, the student will be able to identify tools required to maintain the equipment in a facility/building
119. Upon completion of the course, the student will be able to identify opportunities for predictive maintenance of equipment in a facility/building
120. Upon completion of the course, the student will be able to identify opportunities for reliability centered maintenance of equipment in a facility/building
121. Upon completion of the course, the student will be able to identify appropriate timing for maintenance (when can it be done to eliminate interference with operations) of equipment in a facility/building
122. Upon completion of the course, the student will be able to identify frequency of maintenance for equipment in a facility/building
123. Upon completion of the course, the student will be able to compare equipment needs in a facility/building to the available budget
124. Upon completion of the course, the student will be able to prioritize equipment maintenance tasks
125. Upon completion of the course, the student will be able to document equipment maintenance procedures
126. Upon completion of the course, the student will be able to create equipment maintenance programs
127. Upon completion of the course, the student will be able to document any equipment maintenance deviations from OEM standards
128. Upon completion of the course, the student will be able to plan for third party inspections/maintenance
129. Upon completion of the course, the student will be able to identify the criticality of various systems and equipment in a facility/building

130. Upon completion of the course, the student will be able to demonstrate knowledge of equipment failure modes
131. Upon completion of the course, the student will be able to describe why it is important to review construction specifications prior to construction design and bid
132. Upon completion of the course, the student will be able to compare construction designs to actual building requirements
133. Upon completion of the course, the student will be able to provide input to construction designs based on existing systems
134. Upon completion of the course, the student will be able to review submittals
135. Upon completion of the course, the student will be able to contribute to commissioning planning
136. Upon completion of the course, the student will be able to participate in commissioning
137. Upon completion of the course, the student will be able to conduct a maintainability analysis prior to construction
138. Upon completion of the course, the student will be able to conduct a surrounding site assessment
139. Upon completion of the course, the student will be able to compare various equipment and systems for equivalency/comparability
140. Upon completion of the course, the student will be able to identify when equipment substitutions are acceptable and when they are not acceptable
141. Upon completion of the course, the student will be able to analyze existing capital renewal plans
142. Upon completion of the course, the student will be able to analyze organizational strategic plans
143. Upon completion of the course, the student will be able to develop and review facility condition indexes
144. Upon completion of the course, the student will be able to advise on new conditions within the facility and property
145. Upon completion of the course, the student will be able to identify a timeline for system and equipment replacements
146. Upon completion of the course, the student will be able to promote sustainable materials and practices for renewal
147. Upon completion of the course, the student will be able to analyze ROI
148. Upon completion of the course, the student will be able to conduct a project failure analysis
149. Upon completion of the course, the student will be able to analyze system lifecycle assessments
150. Upon completion of the course, the student will be able to analyze ongoing maintenance requirements
151. Upon completion of the course, the student will be able to create a schedule for capital renewal to level capital requirements

152. Upon completion of the course, the student will be able to provide input into the facility strategic plan
153. Upon completion of the course, the student will be able to demonstrate knowledge of emerging technologies and tools that may affect facilities/buildings
154. Upon completion of the course, the student will be able to describe the expected life of major building components
155. Upon completion of the course, the student will be able to describe the impact of change on tenant/occupant space
156. Upon completion of the course, the student will be able to describe options for extending the life of equipment and systems
157. Upon completion of the course, the student will be able to develop facility/equipment/system data acquisition and management plans
158. Upon completion of the course, the student will be able to create and maintain asset inventories
159. Upon completion of the course, the student will be able to create and maintain handwritten logs
160. Upon completion of the course, the student will be able to maintain updated building as-built plans
161. Upon completion of the course, the student will be able to maintain updated OEMs
162. Upon completion of the course, the student will be able to maintain inspection records
163. Upon completion of the course, the student will be able to develop data retention policies
164. Upon completion of the course, the student will be able to determine data storage capabilities and needs
165. Upon completion of the course, the student will be able to determine offsite data storage requirements
166. Upon completion of the course, the student will be able to determine data interoperability levels
167. Upon completion of the course, the student will be able to determine data access levels
168. Upon completion of the course, the student will be able to demonstrate knowledge of basic data architecture models
169. Upon completion of the course, the student will be able to demonstrate knowledge of contingency plans for data recovery
170. Upon completion of the course, the student will be able to demonstrate knowledge of regulatory requirements for data recordkeeping
171. Upon completion of the course, the student will be able to manage responses to inclement weather conditions/issues
172. Upon completion of the course, the student will be able to create inclement weather action plans
173. Upon completion of the course, the student will be able to identify areas that are vulnerable to inclement weather

174. Upon completion of the course, the student will be able to redirect resources during inclement weather situations
175. Upon completion of the course, the student will be able to prepare and stock for inclement weather incidents
176. Upon completion of the course, the student will be able to restock following inclement weather incidents
177. Upon completion of the course, the student will be able to maintain inclement weather response resources
178. Upon completion of the course, the student will be able to plan for processes/services that cannot be disrupted during inclement weather situations
179. Upon completion of the course, the student will be able to communicate inclement weather activities with tenants/occupants and stakeholders
180. Upon completion of the course, the student will be able to manage and schedule staff to address inclement weather conditions/issues
181. Upon completion of the course, the student will be able to train staff on the inclement weather action plans
182. Upon completion of the course, the student will be able to monitor inclement weather forecasts
183. Upon completion of the course, the student will be able to identify the core issues of tenant/occupant requests
184. Upon completion of the course, the student will be able to describe how to document tenant/occupant issues or requests
185. Upon completion of the course, the student will be able to prioritize responses to tenant/occupant requests
186. Upon completion of the course, the student will be able to identify appropriate staff to address tenant/occupant issues
187. Upon completion of the course, the student will be able to describe how to communicate actions throughout the response to tenant/occupant requests
188. Upon completion of the course, the student will be able to describe typical lead-times for responses to tenant/occupant requests
189. Upon completion of the course, the student will be able to describe how to manage tenant/occupant expectations
190. Upon completion of the course, the student will be able to document resolution of responses to tenant/occupant requests and issues
191. Upon completion of the course, the student will be able to track resources required for responses to tenant/occupant requests and issues
192. Upon completion of the course, the student will be able to review prior tenant/occupant requests (trend analysis, historical data)
193. Upon completion of the course, the student will be able to identify opportunities for improvement

194. Upon completion of the course, the student will be able to identify PPE need for responses to tenant/occupant requests and issues
195. Upon completion of the course, the student will be able to conduct equipment checks
196. Upon completion of the course, the student will be able to identify facility/building equipment/systems that require daily checks
197. Upon completion of the course, the student will be able to describe how to record equipment check readings
198. Upon completion of the course, the student will be able to collect equipment operating data
199. Upon completion of the course, the student will be able to respond to equipment anomalies
200. Upon completion of the course, the student will be able to conduct necessary equipment tests
201. Upon completion of the course, the student will be able to determine frequency for equipment checks
202. Upon completion of the course, the student will be able to adjust equipment based on readings
203. Upon completion of the course, the student will demonstrate knowledge of how to interpret equipment test readings
204. Upon completion of the course, the student will demonstrate knowledge of normal equipment operating parameters and limits
205. Upon completion of the course, the student will be able to describe how to conduct daily rounds
206. Upon completion of the course, the student will be able to describe how to physically tour facilities
207. Upon completion of the course, the student will be able to identify areas requiring efficiency upgrades or needing improvements
208. Upon completion of the course, the student will be able to identify energy conservation opportunities (lights on in unoccupied areas, ventilation issues, HOA switches, etc.)
209. Upon completion of the course, the student will be able to observe for other indicators of issues (odd smells, etc.)
210. Upon completion of the course, the student will be able to check remote and other automated monitoring systems
211. Upon completion of the course, the student will be able to check for common or known issues
212. Upon completion of the course, the student will be able to describe how to document deficiencies noted
213. Upon completion of the course, the student will demonstrate knowledge of common or frequent deficiencies found during daily rounds
214. Upon completion of the course, the student will demonstrate knowledge of the sequence of systems
215. Upon completion of the course, the student will be able to coordinate normal facility operations
216. Upon completion of the course, the student will be able to verify occupied, unoccupied and standby schedules

217. Upon completion of the course, the student will be able to compile equipment schedules
218. Upon completion of the course, the student will be able to validate equipment availability
219. Upon completion of the course, the student will be able to optimize equipment start ups
220. Upon completion of the course, the student will be able to obtain peak demand loads
221. Upon completion of the course, the student will be able to start equipment
222. Upon completion of the course, the student will be able to stop equipment
223. Upon completion of the course, the student will be able to verify equipment is operating within normal seasonal parameters
224. Upon completion of the course, the student will be able to verify systems availability
225. Upon completion of the course, the student will be able to evaluate alternative scheduling needs (holidays, inclement weather, etc.)
226. Upon completion of the course, the student will be able to document building operations
227. Upon completion of the course, the student will be able to operate renewable technologies (solar, wind, energy storage systems, distributed generation, water recovery systems, etc.)
228. Upon completion of the course, the student will be able to maintain the BAS system
229. Upon completion of the course, the student will be able to maintain the BAS system database
230. Upon completion of the course, the student will be able to complete activity reports
231. Upon completion of the course, the student will demonstrate knowledge of peak demand loads
232. Upon completion of the course, the student will demonstrate knowledge of interlocked equipment
233. Upon completion of the course, the student will demonstrate knowledge of weather related factors affecting equipment (temperatures, dew points, etc.)
234. Upon completion of the course, the student will be able to coordinate non-normal facility operations
235. Upon completion of the course, the student will be able to perform equipment shut downs for maintenances
236. Upon completion of the course, the student will be able to perform equipment load shedding
237. Upon completion of the course, the student will be able to perform equipment lock-out/tag-out
238. Upon completion of the course, the student will be able to shut down equipment for smoke control
239. Upon completion of the course, the student will be able to schedule and notify tenants/occupants of shut downs
240. Upon completion of the course, the student will be able to adjust to utility shut downs
241. Upon completion of the course, the student will be able to verify equipment is ready for normal operations
242. Upon completion of the course, the student will be able to return equipment to normal operations
243. Upon completion of the course, the student will be able to document building operations
244. Upon completion of the course, the student will demonstrate knowledge of lock-out/tag-outs

245. Upon completion of the course, the student will demonstrate knowledge of remote system fluency (DDC, etc.)
246. Upon completion of the course, the student will demonstrate knowledge of load shedding
247. Upon completion of the course, the student will be able to manage the work order process
248. Upon completion of the course, the student will be able to build and maintain an asset inventory
249. Upon completion of the course, the student will be able to establish work order priorities
250. Upon completion of the course, the student will be able to establish work order response times
251. Upon completion of the course, the student will be able to identify the status of work orders
252. Upon completion of the course, the student will be able to document activities associated with work orders (including completion verification)
253. Upon completion of the course, the student will be able to identify responsible party for work orders
254. Upon completion of the course, the student will be able to track labor hours for work orders
255. Upon completion of the course, the student will be able to assign nominal values to work orders
256. Upon completion of the course, the student will be able to identify if work orders are recoverable (charge back, etc.)
257. Upon completion of the course, the student will be able to track resolution of the work order foundation problem
258. Upon completion of the course, the student will be able to verify the quality of work associated with work orders
259. Upon completion of the course, the student will be able to evaluate the efficiency of the work order process
260. Upon completion of the course, the student will be able to train tenants/occupants regarding work order processes
261. Upon completion of the course, the student will be able to track and compile feedback on work order outcomes
262. Upon completion of the course, the student will demonstrate knowledge of asset inventories
263. Upon completion of the course, the student will demonstrate knowledge of work order processes
264. Upon completion of the course, the student will be able to investigate indoor environmental quality
265. Upon completion of the course, the student will be able to monitor remote monitoring systems
266. Upon completion of the course, the student will be able to conduct indoor air quality checks
267. Upon completion of the course, the student will be able to address drafts
268. Upon completion of the course, the student will be able to investigate CO2 alarms
269. Upon completion of the course, the student will be able to survey tenants/occupants about indoor environmental quality

270. Upon completion of the course, the student will be able to identify chemicals in the workplace
271. Upon completion of the course, the student will be able to investigate indoor air quality issues
272. Upon completion of the course, the student will be able to investigate CO alarms
273. Upon completion of the course, the student will be able to conduct random testing to verify building automation systems
274. Upon completion of the course, the student will be able to describe how to control chemicals brought into the workplace
275. Upon completion of the course, the student will be able to verify air exchange (fresh air, exhaust fans) meets requirements
276. Upon completion of the course, the student will be able to investigate and respond to moisture issues
277. Upon completion of the course, the student will be able to investigate gas smells (sewers, etc.)
278. Upon completion of the course, the student will be able to describe protocols for IAQ testing (mold, etc.)
279. Upon completion of the course, the student will be able to describe how to promote the use of low VOC paints
280. Upon completion of the course, the student will be able to schedule construction remodeling work
281. Upon completion of the course, the student will be able to manage ACM programs
282. Upon completion of the course, the student will be able to manage PACM programs
283. Upon completion of the course, the student will be able to develop IEQ plans
284. Upon completion of the course, the student will demonstrate knowledge of when to conduct IEQ tests
285. Upon completion of the course, the student will demonstrate knowledge of contaminant containment protocols
286. Upon completion of the course, the student will demonstrate knowledge of health effects of contaminants (including stay times)
287. Upon completion of the course, the student will be able to describe how to manage tenant/occupant expectations
288. Upon completion of the course, the student will be able to train tenants/occupants in efficiency measures and protocols
289. Upon completion of the course, the student will be able to describe how to introduce new initiatives
290. Upon completion of the course, the student will be able to solicit tenant/occupant feedback and initiatives
291. Upon completion of the course, the student will be able to communicate and manage about tenant/occupant equipment (space heaters, etc.)
292. Upon completion of the course, the student will be able to monitor consumables
293. Upon completion of the course, the student will be able to maintain consumable inventories
294. Upon completion of the course, the student will be able to track consumable usage
295. Upon completion of the course, the student will be able to establish restock levels

296. Upon completion of the course, the student will be able to conduct inventory control activities (fuel, parts, chemicals, etc.)
297. Upon completion of the course, the student will be able to manage recyclables
298. Upon completion of the course, the student will be able to dispose of regulated consumables (batteries, paint, computers, etc.)
299. Upon completion of the course, the student will be able to manage chain of custody on disposal of regulated consumables (batteries, paint, computers, etc.)
300. Upon completion of the course, the student will be able to schedule consumable deliveries
301. Upon completion of the course, the student will be able to store consumables
302. Upon completion of the course, the student will demonstrate knowledge of consumable logistics, sourcing guidelines, shelf life, storage requirements, and inventory control systems
303. Upon completion of the course, the student will be able to manage outside facility contractors/service providers
304. Upon completion of the course, the student will be able to verify contractor/service providers licenses
305. Upon completion of the course, the student will be able to verify contractor/service providers permits
306. Upon completion of the course, the student will be able to verify contractor/service providers insurance
307. Upon completion of the course, the student will be able to verify contractor/service providers compliance with company policies and contract documents
308. Upon completion of the course, the student will be able to verify contractor/service providers compliance with local codes
309. Upon completion of the course, the student will be able to distribute facility rules and regulations to contractor/service providers
310. Upon completion of the course, the student will be able to ensure training is provided to contractor/service providers
311. Upon completion of the course, the student will be able to enforce facility rules and regulations with contractor/service providers
312. Upon completion of the course, the student will be able to analyze contractor/service providers work
313. Upon completion of the course, the student will be able to verify contractor/service providers PPE
314. Upon completion of the course, the student will be able to identify and communicate environmental hazards to contractor/service providers
315. Upon completion of the course, the student will be able to validate contractor/service providers work has been completed prior to payment (progress billing)
316. Upon completion of the course, the student will be able to describe how to obtain lien waivers
317. Upon completion of the course, the student will be able to obtain close-out documents (submittals, as-builts, etc.) or ongoing service documents

318. Upon completion of the course, the student will be able to provide access to contractors/service providers
319. Upon completion of the course, the student will be able to check providers actual performance against contracted service at periodic intervals
320. Upon completion of the course, the student will be able to provide site specific orientation to contractors/service providers
321. Upon completion of the course, the student will demonstrate knowledge of contract requirements associated with outsourced service providers
322. Upon completion of the course, the student will demonstrate knowledge of licensing requirements associated with outsourced service providers
323. Upon completion of the course, the student will demonstrate knowledge of insurance requirements associated with outsourced service providers
324. Upon completion of the course, the student will demonstrate knowledge of permitting requirements associated with outsourced service providers
325. Upon completion of the course, the student will be able to implement an energy management program
326. Upon completion of the course, the student will be able to assist in the development of energy management programs
327. Upon completion of the course, the student will be able to assist in the development of strategic energy plans
328. Upon completion of the course, the student will be able to create energy baselines
329. Upon completion of the course, the student will be able to set goals for energy improvement in a facility/building
330. Upon completion of the course, the student will be able to maintain energy-related operating improvements in a facility/building
331. Upon completion of the course, the student will be able to implement recommissioning or ongoing commissioning energy programs
332. Upon completion of the course, the student will be able to determine targets for energy reductions
333. Upon completion of the course, the student will be able to develop opportunities for energy improvement initiatives in a facility/building
334. Upon completion of the course, the student will be able to obtain buy-in from building tenants/occupants regarding energy management programs
335. Upon completion of the course, the student will be able to support outreach and marketing activities for energy management programs
336. Upon completion of the course, the student will be able to evaluate utility bills
337. Upon completion of the course, the student will be able to investigate opportunities for rebates
338. Upon completion of the course, the student will be able to identify code requirements for energy management programs

339. Upon completion of the course, the student will be able to document results of energy management programs
340. Upon completion of the course, the student will be able to measure and verify savings of energy management programs
341. Upon completion of the course, the student will be able to identify KPIs for energy management programs
342. Upon completion of the course, the student will demonstrate knowledge of break-even analyses
343. Upon completion of the course, the student will demonstrate knowledge of energy conservation opportunities
344. Upon completion of the course, the student will demonstrate knowledge of life cycle costs associated with energy management programs
345. Upon completion of the course, the student will demonstrate knowledge of life cycle accounting practices
346. Upon completion of the course, the student will describe how to conduct a utility bill analysis
347. Upon completion of the course, the student will be able to maintain the facility and systems
348. Upon completion of the course, the student will be able to perform emergency maintenance
349. Upon completion of the course, the student will be able to perform preventive/predictive maintenance
350. Upon completion of the course, the student will be able to perform scheduled maintenance
351. Upon completion of the course, the student will be able to ensure maintenance of life safety systems
352. Upon completion of the course, the student will be able to test emergency power systems
353. Upon completion of the course, the student will be able to maintain water/wastewater systems
354. Upon completion of the course, the student will be able to maintain plumbing systems
355. Upon completion of the course, the student will be able to maintain irrigation systems
356. Upon completion of the course, the student will be able to ensure maintenance of security systems
357. Upon completion of the course, the student will be able to maintain the building envelope
358. Upon completion of the course, the student will be able to ensure maintenance of electrical systems
359. Upon completion of the course, the student will be able to maintain lighting systems
360. Upon completion of the course, the student will be able to maintain mechanical systems
361. Upon completion of the course, the student will be able to maintain other non-facility equipment (food service, laundry, etc.)
362. Upon completion of the course, the student will be able to ensure maintenance of elevator/escalator and other conveyance systems
363. Upon completion of the course, the student will be able to maintain access systems (locks, keys, etc.)

364. Upon completion of the course, the student will be able to ensure maintenance of communications systems
365. Upon completion of the course, the student will be able to inspect structural systems
366. Upon completion of the course, the student will be able to ensure maintenance of medical and laboratory gas systems
367. Upon completion of the course, the student will be able to maintain wall systems and finishes (paint, drywall, picture frames, etc.)
368. Upon completion of the course, the student will be able to ensure maintenance of firewall penetration integrity
369. Upon completion of the course, the student will be able to oversee the cleanliness of the facility
370. Upon completion of the course, the student will be able to oversee building improvements
371. Upon completion of the course, the student will be able to oversee tenant/occupant improvements
372. Upon completion of the course, the student will be able to oversee storm drainage system maintenance
373. Upon completion of the course, the student will be able to oversee landscaping maintenance
374. Upon completion of the course, the student will be able to manage pest management operations
375. Upon completion of the course, the student will be able to ensure maintenance of air compressor and compressed air systems
376. Upon completion of the course, the student will be able to ensure the maintenance of HVACR systems
377. Upon completion of the course, the student will be able to ensure maintenance of building control systems (BAS, DDC, EMS, BMS, pneumatics, etc.)
378. Upon completion of the course, the student will be able to ensure maintenance of hot water and steam systems
379. Upon completion of the course, the student will be able to maintain utility submetering systems
380. Upon completion of the course, the student will be able to maintain the onsite power generation systems
381. Upon completion of the course, the student will be able to maintain the primary sewage and gray water systems
382. Upon completion of the course, the student will be able to maintain other facility use systems (operational systems such as package tracking, etc.)
383. Upon completion of the course, the student will be able to conduct facility repair activities
384. Upon completion of the course, the student will be able to ensure fire and life safety systems are monitored throughout the repair
385. Upon completion of the course, the student will be able to describe what is required to comply with safety regulations

386. Upon completion of the course, the student will be able to make improvements and repairs to comply with ADA
387. Upon completion of the course, the student will be able to troubleshoot systems
388. Upon completion of the course, the student will be able to identify and manage needed repairs
389. Upon completion of the course, the student will be able to identify repair options or alternatives
390. Upon completion of the course, the student will be able to describe how to comply with infection control risk assessments
391. Upon completion of the course, the student will be able to identify environmental issues (asbestos, VAT, ACMs, lead paint, etc.)
392. Upon completion of the course, the student will be able to identify equipment/source suppliers
393. Upon completion of the course, the student will be able to order repair parts
394. Upon completion of the course, the student will be able to coordinate permitting
395. Upon completion of the course, the student will be able to describe how to ensure business continuity
396. Upon completion of the course, the student will be able to identify sustainable materials (low VOC, etc.)
397. Upon completion of the course, the student will be able to conduct repair verification and follow-up activities
398. Upon completion of the course, the student will be able to dispose of waste
399. Upon completion of the course, the student will be able to conduct measurement and verification activities
400. Upon completion of the course, the student will demonstrate knowledge of EPA regulations
401. Upon completion of the course, the student will be able to obtain equipment and system performance baselines
402. Upon completion of the course, the student will be able to identify expectations from basis of design
403. Upon completion of the course, the student will be able to obtain measurements validating performance against basis of design
404. Upon completion of the course, the student will be able to obtain M&V plan
405. Upon completion of the course, the student will demonstrate knowledge of BAS or monitoring systems
406. Upon completion of the course, the student will demonstrate knowledge of trend analysis techniques
407. Upon completion of the course, the student will be able to conduct an energy audit (ASHRAE Level 1 or 2)
408. Upon completion of the course, the student will be able to establish system performance baselines

409. Upon completion of the course, the student will be able to gather information regarding system performance
410. Upon completion of the course, the student will be able to determine if a facility is being used the way the system was designed for it to be used
411. Upon completion of the course, the student will be able to determine if adequate monitoring equipment exists
412. Upon completion of the course, the student will be able to compare baselines to measured information
413. Upon completion of the course, the student will be able to verify a facility's needs are being met
414. Upon completion of the course, the student will be able to validate a facility's sequence of operations
415. Upon completion of the course, the student will be able to select appropriate measuring equipment
416. Upon completion of the course, the student will be able to obtain key measurements
417. Upon completion of the course, the student will be able to estimate changing use and/or loads
418. Upon completion of the course, the student will be able to identify non-performers (systems that are not performing)
419. Upon completion of the course, the student will be able to compare system performance to internal and external benchmarks
420. Upon completion of the course, the student will be able to identify equipment or system upgrade opportunities
421. Upon completion of the course, the student will be able to develop a facility/equipment/system digital data acquisition plan
422. Upon completion of the course, the student will be able to identify cost saving measures
423. Upon completion of the course, the student will be able to select cost saving equipment (operations)
424. Upon completion of the course, the student will be able to compare old equipment to new technologies
425. Upon completion of the course, the student will be able to calculate total cost of ownership of equipment (capital costs, ownership costs, maintenance costs, etc.)
426. Upon completion of the course, the student will be able to identify recoverable costs
427. Upon completion of the course, the student will be able to identify rebates and incentives
428. Upon completion of the course, the student will be able to develop a business case for upgrade measures
429. Upon completion of the course, the student will be able to set a schedule for implementation of cost savings measures
430. Upon completion of the course, the student will be able to identify negative impacts of change
431. Upon completion of the course, the student will be able to respond to changing energy costs
432. Upon completion of the course, the student will be able to analyze utility costs

433. Upon completion of the course, the student will be able to manage utility interval data (i.e. hourly consumption top establish use patterns)
434. Upon completion of the course, the student will be able to develop contingency plans for energy reduction
435. Upon completion of the course, the student will be able to implement demand management programs
436. Upon completion of the course, the student will be able to perform meter analysis
437. Upon completion of the course, the student will demonstrate knowledge of energy demand management strategies
438. Upon completion of the course, the student will demonstrate knowledge of load demand schedules
439. Upon completion of the course, the student will be able to optimize system performance
440. Upon completion of the course, the student will be able to verify the optimal stop/start routine
441. Upon completion of the course, the student will be able to implement reset schedules (hot and cold water systems, static pressure, discharge temperature, etc.)
442. Upon completion of the course, the student will be able to implement demand control strategies
443. Upon completion of the course, the student will be able to verify existing sensors and add new as needed
444. Upon completion of the course, the student will be able to research demand control ventilation
445. Upon completion of the course, the student will be able to verify critical tenant/occupant schedules and reduce where possible
446. Upon completion of the course, the student will be able to optimize pressure, flow and temperatures in all central systems
447. Upon completion of the course, the student will be able to verify costs savings and optimization
448. Upon completion of the course, the student will be able to adjust set point to eliminate simultaneous heating and cooling
449. Upon completion of the course, the student will be able to ensure all capacity controls are operational
450. Upon completion of the course, the student will be able to compare air balance to baseline
451. Upon completion of the course, the student will be able to manage seasonal use of equipment
452. Upon completion of the course, the student will be able to maintain integration of access with user systems
453. Upon completion of the course, the student will be able to contribute to the development of the energy management program
454. Upon completion of the course, the student will demonstrate knowledge of control theory
455. Upon completion of the course, the student will demonstrate knowledge of energy load profiles

456. Upon completion of the course, the student will demonstrate knowledge of fluid dynamics
457. Upon completion of the course, the student will demonstrate knowledge of heat transfer
458. Upon completion of the course, the student will demonstrate knowledge of psychrometrics
459. Upon completion of the course, the student will demonstrate knowledge of thermodynamics
460. Upon completion of the course, the student will be able to identify sustainability opportunities
461. Upon completion of the course, the student will demonstrate knowledge of waste management programs
462. Upon completion of the course, the student will demonstrate knowledge of water conservation programs
463. Upon completion of the course, the student will demonstrate knowledge of sustainable procurement programs
464. Upon completion of the course, the student will demonstrate knowledge of integrated pest management programs
465. Upon completion of the course, the student will demonstrate knowledge of green cleaning programs
466. Upon completion of the course, the student will demonstrate knowledge of recycling programs
467. Upon completion of the course, the student will be able to implement refrigerant management programs (reduction in CFCs etc.)
468. Upon completion of the course, the student will be able to identify alternative sustainable systems
469. Upon completion of the course, the student will be able to contribute to business case for alternatives
470. Upon completion of the course, the student will demonstrate knowledge of "green teams" with facility tenants/occupants
471. Upon completion of the course, the student will be able to conduct gap analysis to identify sustainability options
472. Upon completion of the course, the student will demonstrate knowledge of heat island reduction (roof and non-roof)
473. Upon completion of the course, the student will demonstrate knowledge of foot-candles/lumens and lighting concepts
474. Upon completion of the course, the student will demonstrate knowledge of local water requirements and restrictions
475. Upon completion of the course, the student will demonstrate knowledge of photometric charts
476. Upon completion of the course, the student will be able to provide recommendations on repairs or replacements
477. Upon completion of the course, the student will be able to create "wish list" of items to be repaired/replaced
478. Upon completion of the course, the student will be able to conduct life cycle assessments

479. Upon completion of the course, the student will be able to forecast staffing, utilities, and other contributory costs
480. Upon completion of the course, the student will be able to review previous budgets and performance against budgets
481. Upon completion of the course, the student will be able to identify future changes in operations or occupancy usage projections
482. Upon completion of the course, the student will be able to benchmark operations budgets (RS means)
483. Upon completion of the course, the student will be able to evaluate equipment and potential failures
484. Upon completion of the course, the student will be able to identify contractors/service providers requirements
485. Upon completion of the course, the student will be able to identify staffing requirements for future service activities
486. Upon completion of the course, the student will be able to identify special maintenance needs
487. Upon completion of the course, the student will be able to identify potential code changes affecting operations
488. Upon completion of the course, the student will be able to review maintenance backlog and deferred activities
489. Upon completion of the course, the student will be able to identify rate increases
490. Upon completion of the course, the student will be able to review non-normal operating categories (snow removal, etc.)
491. Upon completion of the course, the student will be able to manage actual expenditures to budgets