



## DEM113 Electrical/Electronics Systems

### Course Information

Credits	5
Campus	Washburn Institute of Technology
Address	5724 SW Huntoon
City/State/Zip	Topeka, Kansas 66604
Office Fax	785-273-7080

### Description

Electrical/Electronic Systems studies the principles of electricity through operations and testing procedures and provides an introduction to electronics. Diagnostics and repair of battery, starting and charging electrical systems are covered, in addition to practical applications of the principles of electricity. Electronic management programs are referenced and studied. *(KBOR Aligned)*

### Textbooks

**MHT - Shrink-wrapped Package: Tasksheet Manual Includes Systems & Engines / TWO Year Online Access Pack** Publisher: CDX 9781284099874

**OPTIONAL** (in addition to above):

Fundamentals of Medium/Heavy Duty Commercial Vehicle Systems <i>Text-Hard (paper) edition</i>	CDX 9781284041163
Fundamentals of Medium/Heavy Duty Diesel Engines <i>Text-Hard (paper) edition</i>	CDX 9781284067057

### Student Learning Outcomes:

- A. Communicate effectively
- B. Integrate technology
- C. Learn effectively
- D. Demonstrate cooperative teamwork skills
- E. Apply safety in the workplace
- F. Think critically and creatively
- G. Demonstrate responsible work ethics

## Competencies

Rating	Tasks (Competencies) Covered in this Course	Source
XXX	<b>Electrical/Electronics Systems (KBOR Aligned Tasks)</b>	n/a
	1. Apply Ohm's Law	KBOR
	2. Identify general electrical systems components	KBOR
	3. Analyze basic electrical systems	KBOR
	4. Interpret electrical schematics and circuits	KBOR
	5. Identify battery construction and operating principles	KBOR
	6. Identify starting systems components	KBOR
	7. Analyze starting systems components	KBOR
	8. Repair starting systems	KBOR
	9. Identify charging systems components	KBOR
	10. Analyze charging systems	KBOR
	11. Repair charging systems	KBOR
	12. Inspect lighting systems (Performed in DEM148)	KBOR
	13. Repair lighting systems (Perormed in DEM 148)	KBOR
	14. Identify electronic components	KBOR
	15. Identify fault warnings	KBOR
	16. Demonstrate proper use of electrical/electronic service tools	KBOR
	17. Identify data link systems	KBOR
XXX	<b>For every task in Electrical/Electronic Systems, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand protection; proper lifting practices; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of fuels/chemicals/materials in accordance with federal, state, and local regulations.</b>	n/a
XXX	<b>The first task in Electrical/Electronic Systems is to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.</b>	n/a
XXX	<b>V. ELECTRICAL/ELECTRONIC SYSTEMS</b>	n/a
XXX	<b>A. General Electrical Systems</b>	n/a
	1. Read and interpret electrical/electronic circuits using wiring diagrams.	NATEF:P-1
	2. Check continuity in electrical/electronic circuits using appropriate test equipment.	NATEF:P-1
	3. Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using appropriate test equipment.	NATEF:P-1

	4. Check current flow in electrical/electronic circuits and components using appropriate test equipment.	NATEF:P-1
	5. Check resistance in electrical/electronic circuits and components using appropriate test equipment.	NATEF:P-1
	6. Locate shorts, grounds, and opens in electrical/electronic circuits.	NATEF:P-1
	7. Identify parasitic (key-off) battery drain problems; perform tests; determine needed action.	NATEF:P-1
<b>XXX</b>	<b>B. Battery</b>	n/a
	1. Identify battery type; perform appropriate battery load test; determine needed action.	NATEF:P-1
	2. Determine battery state of charge using an open circuit voltage test.	NATEF:P-1
	3. Inspect, clean, and service battery; replace as needed.	NATEF:P-1
	4. Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed.	NATEF:P-1
	5. Charge battery using appropriate method for battery type.	NATEF:P-1
	6. Inspect, test, and clean battery cables and connectors; repair or replace as needed.	NATEF:P-1
	7. Jump start a vehicle using jumper cables and a booster battery or appropriate auxiliary power supply using proper safety procedures.	NATEF:P-1
	8. Perform battery capacitance test; determine needed action.	NATEF:P-2
<b>XXX</b>	<b>C. Starting System</b>	
	1. Perform starter circuit cranking voltage and voltage drop tests; determine needed action.	NATEF:P-1
	2. Inspect and test components (key switch, push button and/or magnetic switch) and wires and harnesses in the starter control circuit; replace as needed.	NATEF:P-2
	3. Inspect and test, starter relays and solenoids/switches; replace as needed.	NATEF:P-1
	4. Remove and replace starter; inspect flywheel ring gear or flex plate.	NATEF:P-1
<b>XXX</b>	<b>D. Charging System Diagnosis and Repair</b>	
	1. Test instrument panel mounted volt meters and/or indicator lamps; determine needed action.	NATEF:P-1
	2. Identify causes of a no charge, low charge, or overcharge problems; determine needed action.	NATEF:P-1
	3. Inspect and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment.	NATEF:P-1
	4. Perform charging system voltage and amperage output tests; perform AC ripple test; determine needed action.	NATEF:P-1
	5. Perform charging circuit voltage drop tests; determine needed action.	NATEF:P-1
	6. Remove and replace alternator.	NATEF:P-1

	7. Inspect, repair, or replace cables, wires, and connectors in the charging circuit.	NATEF:P-1
<b>XXX</b>	<b>The first task in Preventive Maintenance is to listen to and verify operator's concern, review past maintenance documents, and record condition on appropriate document.</b>	n/a
<b>XXX</b>	<b>1. Battery and Starting Systems (PMI Tasks - NATEF)</b>	n/a
	1. Inspect battery box(es), cover(s), and mountings.	NATEF:P-1
	2. Inspect battery hold-downs, connections, cables, and cable routing; service as needed.	NATEF:P-1
	3. Check/record battery state-of-charge (open circuit voltage) and condition.	NATEF:P-1
	4. Perform battery test (load and/or capacitance).	NATEF:P-1
	5. Inspect starter, mounting, and connections.	NATEF:P-1
	6. Engage starter; check for unusual noises, starter drag, and starting difficulty.	NATEF:P-1
<b>XXX</b>	<b>2. Charging System</b>	n/a
	1. Inspect alternator, mountings, cable, wiring, and wiring routing; determine needed action.	NATEF:P-1
	2. Perform alternator output tests.	NATEF:P-1

## Guidelines for Success *(See Program Syllabus for additional information.)*

### Assessment Plan

Assessment is an integral part of the educational process at Washburn Tech and accurate feedback is an important tool in continuously improving the institution's technical programs. Students can expect to participate in assessment activities prior to entry into programs, within specific courses and following program completion for specific fields of study.

### Grading Rationale

Student progress is evaluated by means that include, but not limited to:

- Lab Work (40%)
- Professional Behavior (30%)
- Classroom Activities/Homework (10%)
- Quizzes & Tests (10%)
- Final Exams (10%)

### Grading Scale

90-100% A  
80-89% B  
70-79% C  
60-69% D  
59% or less F

### Attendance

Attendance is a key part of success in the program and in the workplace. Students are to arrive for class on time and be prepared to learn. Absences or tardiness will negatively impact grades. Missed time cannot be made up. Many assignments and labs cannot be "made-up" if missed. The options to make-up missed work or to accept late work is at the discretion of the instructor.

### Disability

The Americans with Disabilities Act (ADA) Office is responsible for assisting in arranging accommodations and for identifying resources at Washburn Institute of Technology for persons with disabilities. Qualified students with disabilities MUST self-identify by completing an application. In addition students must provide appropriate medical documentation to the ADA coordinator to be eligible for accommodations. New requests for accommodations should be submitted at least two months or more prior to the date the accommodations are needed. However, please contact the ADA office as soon as a need may arise. Depending on the accommodation request, four to eight weeks lead time may be needed for timely and effective provision of accommodations.

The ADA Office coordinates and assists in arranging accommodations it deems appropriate for eligible students on a case-by-case basis. If you are a student with a disability that may substantially limit your ability to participate in any of our classes and you believe that you will need accommodations, it is your responsibility to contact:

### ADA Coordinator

**Phone: 785-670-3365 Email: [gloria.christian@washburn.edu](mailto:gloria.christian@washburn.edu)**

It is the policy of Washburn Institute of Technology to assure equal employment and educational opportunity to qualified individuals without regard to race, color, sex, age, ancestry, marital or parental status, disability, religion, national origin, or sexual orientation/gender identity. Contact Pam Foster, Morgan Hall, Room Washburn University (785-670-1509), and [pam.fosterel@washburn.edu](mailto:pam.fosterel@washburn.edu)