FERRIS STATE UNIVERSITY

Heavy Equipment Institute

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The Heavy Equipment Institute at Ferris State University is pleased to announce our workshop courses for the summer 2021. These highly effective workshops have been developed for today's busy truck, heavy equipment, and diesel engine technicians.

Each course is delivered by highly qualified instructors from Ferris State's Heavy Equipment or Welding programs. As with all of our training, these courses are practical and emphasize hands-on applications. Certificates will be awarded to each course completer along with useful course reference binders.

Courses offerings for 2021

- Welding for Maintenance & Repair - *Prerequisite to Welding Fabrication training*
- Fundamentals of Welding Fabrication
- Electrical Systems
- Electrical Systems Troubleshooting
- Fundamentals of Hydraulics
- Hydraulic System Troubleshooting
- Electronic Fuel Systems
- Heavy Duty Air Conditioning Systems
- Advanced Electronic Control Systems
- Diesel Engine Emissions Tier 4 Control Systems

Registering for courses

To learn more about the Heavy Equipment Institute and online registration, see our website at www.ferris.edu/cpd and select "Heavy Equipment Institute". For questions email Shanee Ramsey at cpd@ ferris.edu. We also welcome opportunities to host these or other custom trainings at your facility. For additional information on training and other services offered by Ferris – Corporate and Professional Development, please email to: cpd@ ferris.edu

Heavy Equipment Institute 2021 Schedule

Title/Facility	Dates	Times	Days	Fee
Welding for Maintenance & Repair* Location: FSU Swan Building	5/3/21- 5/5/21	8:00 AM 4:00 PM	Monday- Wednesday	$975.00 (24hours)
Fundamentals of Welding Fabrication Location: FSU Swan Building	5/10/21- 5/12/21	8:00 AM 4:00 PM	Monday- Wednesday	$975.00 (24hours)
Electrical Systems Location: FSU Heavy Equipment Building	5/17/21	8:00 AM 4:00 PM	Monday	$ 425
Electrical Systems Troubleshooting Location: FSU Heavy Equipment Building	5/18/21	8:00 AM 4:00 PM	Tuesday	$ 425
Fundamentals of Hydraulics Location: FSU Heavy Equipment Building	5/19/21	8:00 AM 4:00 PM	Wednesday	$ 425
Hydraulic System Troubleshooting Location: FSU Heavy Equipment Building	5/20/21	8:00 AM 4:00 PM	Thursday	$ 425
Electronic Fuel Systems Location: FSU Heavy Equipment Building	5/26/21	8:00 AM 4:00 PM	Wednesday	$ 425
Heavy Duty Air Conditioning Systems Location: FSU Heavy Equipment Building	5/27/21	8:00 AM 4:00 PM	Thursday	$ 425
Advanced Electronic Control Systems Location: FSU Heavy Equipment Building	6/2/21	8:00 AM 4:00 PM	Wednesday	$ 425
Diesel Engine Emissions Tier 4 Control Systems Location: FSU Heavy Equipment Building	6/3/21 OR 6/7/21	8:00 AM 4:00 PM	Thursday OR Monday	$ 425

* Prerequisite to Welding Fabrication training

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2/26/21

COURSE DESCRIPTIONS

Welding for Maintenance & Repair - *Prerequisite to Welding Fabrication training*
Theory and practical application of common welding and cutting operations used for maintenance and repair operations. Discussion will include safety, process fundamentals and techniques to perform welding and cutting operations in multiple positions using oxy-acetylene, shielded metal arc (STICK), gas metal arc (MIG), flux core, gas tungsten arc (TIG) and plasma arc cutting. Hands on activities will allow participants to setup and operate equipment while developing and refining process techniques and control. The course will include instructor demonstrations followed by guided learning with an emphasis on metal identification and the practical application of welding and cutting processes.

Fundamentals of Welding Fabrication
Theory and practical application of common fabrication techniques used for maintenance and repair operations. Discussions will include basic welding metallurgy, fabrication process fundamentals, distortion controls, punching, shearing, flame shrinking and bending, project design techniques. Hands on activities will allow participants to fabricate small projects utilizing different equipment while developing and refining process techniques and control. The course will include instructor demonstrations followed by guided learning with an emphasis on metal fabrication and the practical application of welding and cutting processes.

Electrical Systems
Basic theory of electricity and electronics as applied to the heavy equipment industry. Instruction will include use of instruments for measuring current, voltage, and resistance. Hands on exercises will focus on calculating current draws, voltage drops, and resistances of series, parallel, and a combination of series and parallel systems. Exercises will also include the construction and testing of series, parallel, and series/parallel systems.

Electrical Systems Troubleshooting
Relationship between voltage, amperage, and resistance; the function and operation of charging systems; and to perform basic battery testing, troubleshooting and maintenance. Instruction will include the construction, testing, and troubleshooting of basic electrical systems and testing and diagnosing of charging systems used in a variety of diesel and gasoline powered vehicles. Hands on exercises include: determining the relationships between voltage, current, and resistance and diagnosing circuit conditions by interpreting voltage and voltage drop measurements. Exercises will also focus on the construction, operation, diagnosing, and troubleshooting of cranking systems and cranking circuit failures using hand-held and portable testing equipment and will include maintenance, charging, troubleshooting, and diagnosing failures of batteries.

Fundamentals of Hydraulics
Theory and practical application of fluid power principles as applied to the heavy equipment industry. Instruction will include testing, diagnosing, and troubleshooting of mobile hydraulic systems and their components. Hands on exercises will focus on reading and understanding hydraulic schematics and symbols, along with using pressure gages and flow meters to test, troubleshoot, and diagnose failures of hydraulic systems.

Hydraulic System Troubleshooting
Mobile pumps, pump controls, mobile proportional valving, load sensing systems and troubleshooting using schematics, electronics controls, and interface of electronics to hydraulic controls.

Electronic Fuel Systems
This course provides a working knowledge of electronic diesel fuel systems. Course topics include the operating principles of diesel fuel system hydraulics, electronic and electronic over mechanical injection systems, tune-up procedures, and servicing of electronic fuel systems. An emphasis will be placed on the use of electronic diagnostic tools to properly diagnose and maintain diesel electronic fuel systems. Hands-on exercises target the identification, location, and testing of electronically controlled diesel fuel system components. Participants will also practice using diagnostic software to troubleshoot and diagnose failures of electronic diesel fuel injection circuits.

Heavy Duty Air Conditioning Systems
This course provides a basic understanding of the theory of mobile equipment air conditioning systems. Course topics include the basic refrigeration cycle, air conditioning control systems, proper diagnosis and repair of mobile A/C systems, and safe handling of refrigerants. An emphasis will be placed on the use of A/C servicing tools including manifold gauge sets, vacuum pumps, refrigerant recovery/recycling machines, and leak detectors. Hands-on activities include identification, testing, evacuation, and recharge of mobile A/C systems.

Advanced Electronic Control Systems
This course provides a working knowledge of electronic control systems on heavy duty trucks and mobile equipment. Course topics include the operating principles of interactive electronic control systems, on-vehicle networking systems, sensing circuits, and actuation devices. An emphasis will be placed on the use of electronic diagnostic tools to properly diagnose and maintain computer management and CAN Bus systems. Hands-on exercises target the identification, location, and testing of electronically controlled mobile equipment systems. Participants will also practice using diagnostic software to troubleshoot and diagnose failures of electronic controlled sensing and actuation circuits.

Diesel Engine Emissions Tier 4 Control Systems
Practical knowledge needed to perform routine maintenance, diagnose, and repair of diesel engine tier 4 emission systems. Instruction will include the operation, testing, trouble-shooting and repair of tier 4 emission system technologies. Instruction will also include the specific maintenance processes and procedures required by tier 4 emission systems. Lab exercises will focus on required testing equipment, on-board diagnostics, and system controls. Participants will learn to monitor and retrieve diagnostic data from electronic controlled tier 4 emissions systems. The instructor will demonstrate how to analyze available data in order to diagnose and develop a corrective action for systems faults.