

# FERRIS STATE UNIVERSITY - HEAVY EQUIPMENT INSTITUTE

## Heavy Equipment Institute

The Heavy Equipment Institute at Ferris State University is pleased to announce our workshop courses for Summer 2023. 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 2023

- 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
- Welding for Maintenance & Repair - Prerequisite to Welding Fabrication training
- Fundamentals of Welding Fabrication
- Advanced Welding and Repair Welding – Prerequisite to Welding for Maintenance & Repair PLUS Welding Fabrication training

## Registering for Courses

To learn more about the Heavy Equipment Institute and online registration, see our website at **Ferris.edu/CPD** and select "Heavy Equipment Institute". For questions email Shancee 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 **CPD@Ferris.edu**.

## HEAVY EQUIPMENT INSTITUTE 2023 SCHEDULE

TITLE/FACULTY	DATES	TIMES	DAYS	FEE
Electrical Systems Location: FSU Heavy Equipment Building	5/8/23	8 a.m. - 4 p.m.	Mon	\$450
Electrical Systems Troubleshooting Location: FSU Heavy Equipment Building	5/9/23	8 a.m. - 4 p.m.	Tues	\$450
Fundamentals of Hydraulics Location: FSU Heavy Equipment Building	5/10/23	8 a.m. - 4 p.m.	Wed	\$450
Hydraulic System Troubleshooting Location: FSU Heavy Equipment Building	5/11/23	8 a.m. - 4 p.m.	Thurs	\$450
Electronic Fuel Systems Location: FSU Heavy Equipment Building	5/15/23	8 a.m. - 4 p.m.	Mon	\$450
Heavy Duty Air Conditioning Systems Location: FSU Heavy Equipment Building	5/16/23	8 a.m. - 4 p.m.	Tues	\$450
Advanced Electronic Control Systems Location: FSU Heavy Equipment Building	5/17/23	8 a.m. - 4 p.m.	Wed	\$450
Diesel Engine Emissions Tier 4 Control Systems Location: FSU Heavy Equipment Building	5/18/23	8 a.m. - 4 p.m.	Thurs	\$450
Welding for Maintenance & Repair Location: FSU Swan Building	6/6/23– 6/8/23	8 a.m. - 4 p.m.	Tues– Thurs	\$1000 (24 hrs)
Fundamentals of Welding Fabrication* Location: FSU Swan Building	6/13/23– 6/15/23	8 a.m. - 4 p.m.	Tues– Thurs	\$1000 (24 hrs)
Advanced Welding and Repair Welding** Location: FSU Swan Building	6/20/23– 6/22/23	8 a.m. - 4 p.m.	Tues– Thurs	\$1000 (24 hrs)

\* Prerequisite Welding for Maintenance & Repair

\*\* Prerequisite Welding for Maintenance & Repair PLUS Welding Fabrication training

**\*Lunch and Snacks provided\***



## COURSE DESCRIPTIONS

### 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.

### 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.

### 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.

### 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.

### 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 oxyacetylene, 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.

### 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.

### 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.

### 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.

### 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.

### 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.

### Advanced Welding and Repair Welding

Theory and practical application of common advanced welding techniques used for maintenance and repair welding on different material types and thicknesses. Discussions will include advanced welding techniques, advanced process fundamentals, casting repairs, stainless steel and aluminum. Hands on activities will allow participants to develop a higher skill level necessary when welding different material thicknesses and types.

# FERRIS STATE UNIVERSITY

CORPORATE AND PROFESSIONAL DEVELOPMENT

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EXPLORE THE HEAVY  
EQUIPMENT INSTITUTE

