

## Transportation Technologies (TT)

### TT 3126

#### Advanced Hydraulics

3

\* Prerequisite(s): Matriculation and University Advanced Standing

Utilizes advanced thermal imagery to examine efficiency loss in fluid power systems. Demonstrates the operation and diagnosis of electronic over hydraulic controls. Demonstrates diagnosis of closed loop and closed circuit fluid power systems. Examines micro-leak testing of hydraulic system components. Focuses on electrical over hydraulic schematic interpretation.

### TT 3140

#### Vehicle Safety and Emissions

3

\* Prerequisite(s): Matriculation and University Advanced Standing

Studies testing and diagnostics of vehicle safety systems, SRS systems, and adaptive strategies on modern vehicles. Explores current EPA standards and regulations and future emissions testing requirements in the automobile industry.

### TT 3230

#### High Performance Engines

3

\* Prerequisite(s): Matriculation and University Advanced Standing

Offers a more in-depth study of the design factors that are unique to high output engines and how to modify engines to obtain the desired outcome. Studies the characteristics of various fuels used in high performance engines and their effects. Discusses the implications of service learning and ethics in high performance engine applications. Tool room fee of \$19 for equipment applies. Course Lab fee of \$17 for materials applies.

### TT 3260

#### Energy Storage and Advanced Electrical

3

\* Prerequisite(s): Matriculation and University Advanced Standing

Explores advances in electronics and energy storage systems found on Battery Electric Vehicles (BEV), Hybrid Electric Vehicles (HEV), and Plug-in Hybrid Electric Vehicles (PHEV). Topics include advanced operation, repair, diagnosis and troubleshooting of BEVs, HEVs and PHEVs using manufacturer-specific diagnostic tools and equipment.

### TT 3320

#### Design and Construction

3

\* Prerequisite(s): Matriculation and University Advanced Standing

Analyzes the current use and function of advanced systems and materials used in modern and future transportation vehicles. Includes advanced driver assistance and urban air mobility systems, their function and diagnostic calibration and repair procedures. Teaches advanced structural material usage and the damage analysis process necessary for proper advanced system repair.

### TT 3350

#### Alternative Fuel Systems

3

\* Prerequisite(s): Matriculation and University Advanced Standing and AUT 2250 or AUT 2260 recommended

\* Corequisite(s): AUT 2240 recommended

Studies current and upcoming alternatives to gasoline as a fuel for the transportation industry that are being promoted, used, and developed by sources within and without the mainstream production system. Includes new alternatives such as CNG/Propane, hydrogen, electric, hybrid (both plug-in and non-plug-in), bio-fuels (both diesel and alcohol), diesel, and fuel cells such as proton exchange membranes. Discusses the implications of service learning and ethics in alternative fuel powered vehicles.

### TT 3406

#### High Performance Diesel Engines

3

\* Prerequisite(s): Matriculation and University Advanced Standing

Studies the operation and performance efficiencies of light duty, heavy duty and industrial applications of diesel engines including marine, mining and gen-sets. Examines current engine performance advancements and designs with modern technology. Utilizes Dynamometer testing to analyze engine performance differences in relation to the design theory.

### TT 3450

#### Failure Analysis Materials Science and Treatments

3

\* Prerequisite(s): Matriculation and University Advanced Standing

Analyzes the physical properties and applications of metals, ceramics, composites, surface treatments and polymers. Studies Material Science Technology, including the study of organic and Inorganic matter and solid matter. Researches and describes the means and data to determine root causes of failure. Introduces FMEA (Failure Mode Effects Analysis) and PFMEA (Process Failure Mode Effects Analysis). Conducts both NDT (Non Destructive Testing) and DT (Destructive Testing) methods. Utilizes testing equipment for compliance with ASTM (American Standard Testing Methods).

### TT 3460

#### Can Bus Ladder Logic and PLC Systems

3

\* Prerequisite(s): Matriculation and University Advanced Standing

Explores in vehicle network communication systems including: Network system protocols, body control modules and other LAN controllers, and smart sensors. Covers development and current trends in use of CAN BUS and network systems and sensors in modern automobiles. Introduces the use of scan tools and other diagnostic tools and diagnostic strategies. Covers updating of CAN BUS systems through factory tools and software and theory, programming, and industrial control system applications of small and medium sized programmable logic controllers (PLCs). Studies basic maintenance, operation, troubleshooting, and programming.

### TT 3500

#### Fabrication and Automotive Interior Design

3

\* Prerequisite(s): Matriculation and University Advanced Standing

Explores basic fabricating tools such as sheet metal brake, slip rolls, band saw, and nibblers. Uses specialty tools such as English wheel, power hammer, kraft former, plenish hammer, shrinkers, and stretchers. Teaches panel fabrication and hammer forming on steel and aluminum panels. Explores the design process of vehicles, advanced interior components and materials.

### TT 3840

#### Dynamometer/Data Acquisition

3

\* Prerequisite(s): Matriculation and University Advanced Standing

Studies dynamometer testing and evaluation tools and skills relevant to data acquisition systems. Analyzes data collected to measure horsepower, torque, and energy output. Teaches how to collect and create proper baselines and testing procedures. Discusses compiled data to help change drivability and manage the many different systems on the vehicle.

### TT 4000

#### Capstone

3

\* Prerequisite(s): TT 4510, TT 4270, and University Advanced Standing

Provides a leadership transition from academic to applied/real-life work experience. Includes students, company liaison, and coordinator evaluation, on-site work visits, written assignments and oral presentations, creation of transportation related business improvements. Offers experience in establishing and accomplishing team objectives that improve their ability and add real value in their future employment.

# Course Descriptions

## **TT 4230**

### **Advanced Welding Technologies and Attachment Methods**

**3**

\* Prerequisite(s): CRT1230, CRT2510, Matriculation, and University Advanced Standing

Explores all welding processes. Investigates advanced welding processes such as MIG, TIG, ARC, laser welding, friction welding, explosive welding, ultra-sonic welding, and electron beam welding. Examines attachment methods with the use of rivet technology in conjunction with panel bonding technology. Covers advanced attachment processes of the future.

## **TT 4260**

### **Electric Drive Systems**

**3**

\* Prerequisite(s): TT 3260 and University Advanced Standing

Introduces power electronics and electric drive systems electronic devices and their switching performance and thermal design including: power converters, AC-AC converters, DC-DC converters, inverters. Analyzes energy-efficient AC and DC motor drives.

## **TT 4270**

### **Compliance EPA OSHA Others WE**

**3**

\* Prerequisite(s): Matriculation and University Advanced Standing

Analyzes the Environmental Protection Agency (EPA) purpose, powers, and the regulations as it relates to Transportation Technologies. Covers the national program for greenhouse gas emissions (GHG) and fuel economy standards for light-duty vehicles. Includes the study of the National Highway Traffic Safety Administration (NHTSA) guides. Explores Occupational Safety and Health Administration (OSHA) case studies, lawsuits, and depositions as it pertains to transportation. Covers passenger cars, over-the-road heavy trucks, equipment, and off-road vehicle regulations and laws.

## **TT 4320**

### **Noise Vibration and Harshness**

**3**

\* Prerequisite(s): TT 3840 and University Advanced Standing

Analyzes the production of and the modification of noise, vibration and harshness characteristics of transportation vehicles. Measures noise and vibration frequencies and harmonics. Uses analytic tools and jury evaluations to reflect human subjective interpretations of noise, vibration and harshness (NVH). Evaluates case studies of NVH.

## **TT 4400**

### **Advanced Composites**

**3**

\* Prerequisite(s): Matriculation and University Advanced Standing

Examines advanced composite materials, processes, layup/lamination, vacuum bagging, adhesive bonding, tooling, repair, proper surface preparation and inspection methods and techniques. Includes lecture, demonstration and practical application.

## **TT 4510**

### **Operations Management Fleet and Personnel WE**

**3**

\* Prerequisite(s): Matriculation and University Advanced Standing

Studies common shop managerial skills and techniques. Explores strategies in streamlining efficiency through inventory control, targeted scheduling, shop-based software implementation. Offers exposure to the hierarchy of positions in a fleet or shop setting. Studies manufacturer warranty process and approvals, personnel management skills, inventory control, fleet maintenance procedures and deployment. Instructs on the production of written improvement policy plans.

## **TT 4840**

### **Performance Tuning**

**3**

\* Prerequisite(s): AUT 2250, TT 3840, and University Advanced Standing

Studies computer communication processes, sharing of data and information of vehicles. Studies requirements, opportunities, and challenges of re-programming factory computers. Explores aftermarket computer use on engine operations.