

# **DIESEL TECHNOLOGY**

## **PROGRAM EXPANSION**

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**Presented to the South Dakota  
State Board of Education January 2016**

**For Implementation Fall 2016**

**SOUTHEAST  
TECH**

**Southeast Technical Institute  
2320 N Career Ave | Sioux Falls, SD 57107**

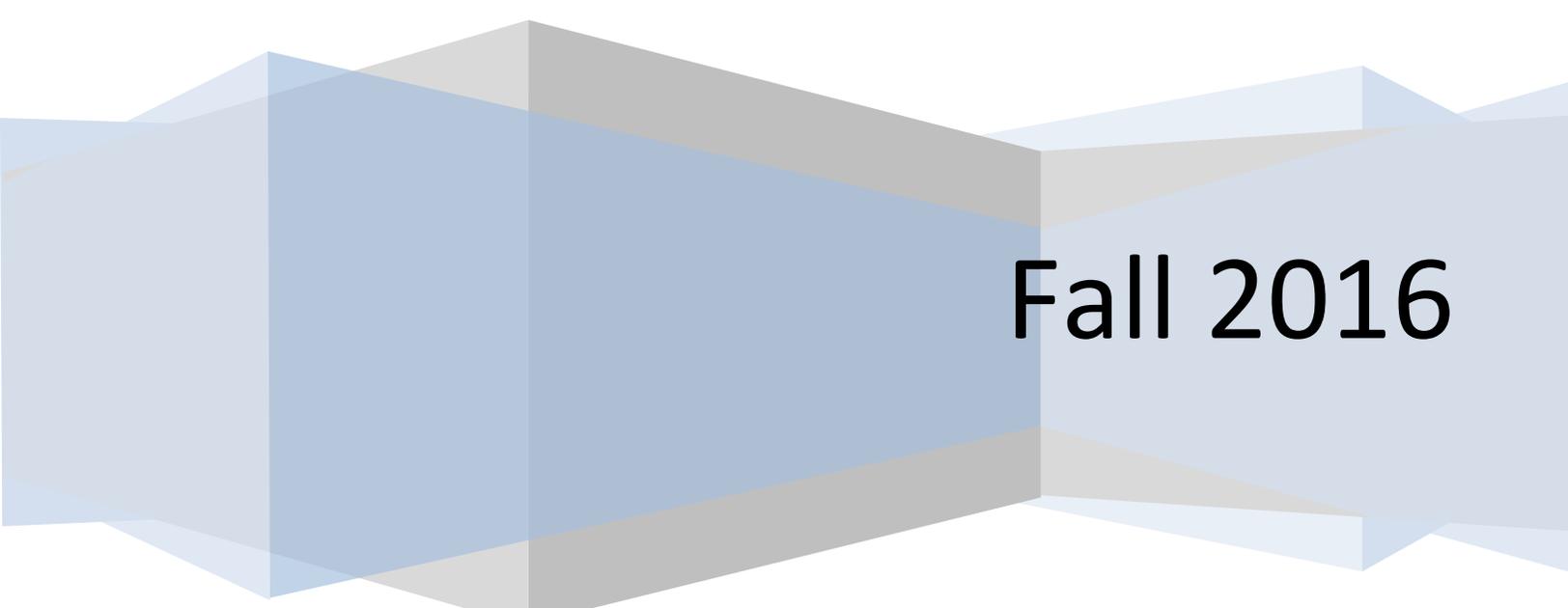
**Southeast Technical Institute**  
**2320 N Career Avenue**  
**Sioux Falls, SD 57107**

## **Diesel Technology**

### **Program Expansion**

**Diploma and Associates in Applied Sciences Degree**

**Presented to the South Dakota State Board of Education**



**Fall 2016**

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# Southeast Technical Institute

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Program Proposal: Diesel Technology – Program Expansion

Length of Program: Four Semesters

Number of Students: 24 per cohort

Projected Start Date: Fall 2016

## Executive Summary

Southeast Technical Institute is proposing an expansion of the Diesel Technology AAS Degree and Diploma options to include a common first year curriculum and emphases in Transportation and Agriculture/Construction to meet industry demand for Diesel technicians.

The current Diesel Technology program, with options for either an AAS or Diploma, is focused on over-the-road transportation equipment. Students receive instruction and perform hands-on work on semi tractors, diesel-powered generator sets and customer-owned equipment.

The proposed expansion will include instruction and hands-on experience with equipment commonly used in the agricultural and construction fields. Curriculum will be expanded to include additional instruction and experience on critical systems such as emissions, hydraulics and electronics.

Diesel Technicians serve a vital role in the agricultural, construction and transportation industries. Technicians install, trouble-shoot, maintain and repair systems and components on diesel-powered equipment in order to provide reliability, efficiency and reduced down-time in some of the region's top industries.

With sustained regional growth and a strengthening economy, the demand for skilled diesel technicians is at unprecedented levels. As evidenced by input presented at meetings with the Diesel Technology Advisory Committee and letters of support (Appendix C), local contractors and dealerships express continued frustration in finding enough qualified workers to meet their needs. This expansion will allow Southeast Tech to increase the capacity of the Diesel Technology program and at the same time expand the curriculum to address high-demand service areas such as emissions after-treatment, electro-hydraulics and advanced system diagnostics.

## Identification and Description of the Program

The Diesel Technology industry relates to the maintenance and repair of equipment used in the agriculture, construction and transportation industries. Graduates are able to work for contractors, dealerships, service and repair facilities, and as small-business owner/operators.

The Diesel Technology program at Southeast Tech is designed to provide graduates with the skills required to become a productive technician immediately upon graduation. Students will work towards graduation criteria and will also have the opportunity to obtain industry-recognized Automotive Service Excellence (ASE) certifications.

The expansion of this program will provide the student with the option to select either an Associate's of Applied Science (AAS) degree or a Diploma, with choices in general education courses and transferability being the differentiating factors. Program details for both options are included in Appendix B. Upon approval of this proposal, students will complete a common first-year curriculum and then have the option to choose from a Transportation or Agricultural/Construction emphasis. Technical content for each emphasis is tailored to meet the needs of the industry sectors based on regulations, technology and application.

This program will cover theory, operation and maintenance of diesel engines and diesel related systems including: power transfer and drive systems, electrical systems, environmental systems (heating and air-conditioning), electrical, hydraulic and pneumatic systems. The curriculum will consist of instruction in the preceding areas of study with supporting laboratory classes for all areas. A core of General Education courses including Math, English, computer skills, Social Sciences and Psychology will be included.

## **Objectives and Purpose of the Program**

The primary objective of this program expansion is to increase the number of qualified diesel technicians for the agriculture, construction and transportation industries. This objective will be met by providing an education that prepares the graduate to be employed as a technician for contractors, service and repair facilities, and dealerships or as small-business owner/operators.

The Diesel Technology industry of made up of professionals serving many different roles. There is a constant demand for qualified technicians in the region to serve these roles.

The objectives of the program include:

- Analyze, maintain and repair diesel engines and their sub-systems
- Analyze, maintain and repair diesel-related environmental systems
- Analyze, maintain and repair diesel-related electrical systems
- Analyze, maintain and repair diesel-related hydraulic systems
- Analyze, maintain and repair diesel-related pneumatic systems
- Incorporate technology and best practices in the above processes
- Develop and employ excellent communications skills
- Develop and employ excellent interpersonal skills

## **Methods of Attaining the Objectives of the Program**

Upon receipt of the State Board of Education approval, Southeast Technical Institute will accept up to 24 additional students beginning in the Fall Semester of 2016. An additional 24 students will be accepted for the Fall 2017 semester as the Transportation and Agricultural/Construction paths are phased in. The marketing campaign to recruit students will include a comprehensive media mix as well as high school visits, college fairs and on-campus recruiting activities.

The two-year Diesel Technology AAS Degree expansion will consist of classes in Diesel Engine Theory, Drive System Theory, Electrical System Theory and Hydraulic System Theory. Students will receive an extensive amount of laboratory time in hands-on applications to develop their skill and prepare them for employment.

The Diesel Technology program will be offered traditionally, during the day, at Southeast Technical Institute.

During the development of the Diesel Technology program expansion, Southeast Technical Institute obtained guidance from Advisory Committee members as well as several individuals in the industry. Appendix B contains letters of support from several of those individuals and companies from whom we received input and guidance. Southeast Tech will further develop its Diesel Technology advisory committee to assist in the refinement of curriculum and to strengthen ties to industry in the transportation, agricultural and construction fields.

## Description of Labor Market Demands of the United States, State of South Dakota, Student Needs, and Industry Support

### National Data

According to the 2012 – 2022 National Bureau of Labor Statistics, there is an expected increase of 9.4% or 53,500 employees for Diesel Technicians nationwide. There is also an additional availability of 202,700 positions during this period due to retirement and replacements. See Table Below (numbers in thousands).

2012 National Employment Matrix title and code		Employment				Job openings due to growth and replacements, 2012-22
		Number		Change, 2012-2022		
		2012	2022	Number	Percent	
Bus and truck mechanics and diesel engine specialists	49-3031	250.8	272.5	21.6	8.6	75.1
Farm equipment mechanics and service technicians	49-3041	35.8	39.2	3.4	9.5	13.8
Mobile heavy equipment mechanics, except engines	49-3042	119.3	131.6	12.3	10.3	46.7
Industrial machinery Mechanics	49-9041	319.3	379.6	60.3	18.9	152.5

(numbers in thousands)

## State/Regional Data

According to the 2012 – 2022 South Dakota Occupational Employment Projections, there is an average expected increase of 8.98% in demand for Diesel Technicians. This is a projected increase of 405 positions during this period and an average of 135 positions annually. See Table Below.

<b>SOC Code</b>	<b>Occupational Title</b>	<b>2012 Employment</b>	<b>2022 Employment</b>	<b>Numeric Change</b>	<b>Percent Change</b>	<b>Average Annual Demand for Workers</b>
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	1,150	1,220	70	6.1%	32
49-3041	Farm Equipment Mechanics and Service Technicians	1,100	1,170	70	6.4%	39
49-3042	Mobile Heavy Equipment Mechanics, except Engines	485	525	40	8.2%	18
49-9041	Industrial Machinery Mechanics	845	1,070	225	26.6%	46
	<b>Totals:</b>	<b>3580</b>	<b>3985</b>	<b>405</b>	<b>8.98%</b>	<b>135</b>

## Student Needs

This program will provide students with an opportunity to enter an expanding industry that has many different entry points, areas for growth, and training that meets industry need. The majority of students will enter as an entry-level technician and work towards the master-technician level.

## Industry support

Southeast Technical Institute has met with leaders of several Ag/Construction Equipment dealers and repair facilities in Sioux Falls and the surrounding region and has received very positive feedback as indicated by the letters of support attached in Appendix C. These companies have indicated that the current number of qualified applicants is not sufficient to keep pace with industry growth and attrition.

## Population Served by the Program

Southeast Technical Institute will recruit students from a variety of backgrounds, including both traditional and non-traditional. It is anticipated that this program will attract students directly out of high school in addition to those who are unemployed, underemployed and those wanting to make a career change.

## Program Capacity

The current Diesel Technology program consists of two cohorts per year, each with an enrollment of up to 28 students. Capacity is dictated by facility space and the ability of instructors and lab specialists to safely and effectively manage students in a shop setting.

The transition into a new facility, scheduled to open in August, 2016, will result in a significant increase in space to accommodate two additional cohorts per year. This increase in space will also allow additional entry and exit points, facilitating larger graduate numbers for both spring and fall semesters.

Starting Semester	Delivery Format	Added Capacity
Fall 2016	Traditional Day	48

## Salaries/Benefits/FTE/Equipment

The Diesel Technology program expansion will require an additional two full-time instructors and one full-time lab specialist at full implementation. These positions will be added as new curriculum is phased in to accommodate the delivery of the added agricultural/construction emphasis. Laboratories for working on farm implements, heavy equipment, engines and sub-systems will be housed in a building to be completed during the summer of 2016. Southeast Technical Institute has established a plan using Perkins, capital outlay and capital equipment funds to provide facilities, supplies and equipment needed for the successful implementation of this program expansion.

## Projected Three-Year Budget Plan

<b>BUDGET PROJECTIONS</b>			
<b>Year</b>	<b>2016-2017</b>	<b>2017-2018</b>	<b>2018-2019</b>
Salaries/Benefits (3 FTE)	\$426,060	\$443,102	\$460,826
Staff Travel	\$6,500	\$6,500	\$6,500
Instructional Materials	\$45,000	\$45,000	\$45,000
Equipment Leases	\$25,000	\$25,000	\$25,000
Capital Equipment	\$601,863	\$300,932	\$300,931
Software/Books/Fees	\$15,000	\$13,500	\$13,000
<b>Totals</b>	<b>\$1,119,423</b>	<b>\$834,034</b>	<b>\$851,257</b>

## Program Competencies and entry and exit points of sub-occupations

The entry and exit points are for that of a traditional two-year AAS Degree and Diploma. Students will be accepted each semester with graduation occurring in December and May of each year.

Entry Point: Fall 2016

Exit Point: Spring 2018; Students will graduate with a two-year AAS Degree or Diploma, either with an emphasis in Transportation or Ag/Construction.

## Statement of non-duplication

Southeast Tech understands and acknowledges that there are other Diesel Technology programs offered in South Dakota. However, employers have indicated that the current pool of qualified applicants is not sufficient to meet growing industry needs.

According to the 2012 – 2022 South Dakota Occupational Employment Projections, there is an annual projected demand of 135 diesel technicians (see page 8 of this proposal). An internet search of agricultural and construction equipment dealers in South Dakota yields a total of 99 such businesses. The combined 2014 graduating classes from Lake Area, Mitchell and Southeast Technical institutes produced a total of 106 diesel technicians. This translates to a net contribution of 1.07 technicians per

service facility. During research for this proposal, a number of local employers communicated expectations of having three to five diesel technician openings per year, for the foreseeable future.

Given the current and projected labor shortage, this proposed expansion of the Diesel Technology program at Southeast Tech has broad local and regional support from those businesses in a position to employ program graduates.

## **Curriculum design and research**

Southeast Technical Institute designed a tentative curriculum after an extensive review consisting of curriculum searches, academic review of competencies, and through discussion with industry professionals. The resulting curriculum is provided in Appendix A.

## Wage Factor

Data from the South Dakota Department of Labor Occupational Wage Estimates through June 2015 positions the average hourly wage from \$18.57 to \$23.22 (\$38,625 - \$48,288 annually).

See Table Below:

### Wages Updated to Quarter Ending June 2015

Selected

Areas: **South Dakota**

Sorted

By: **SOC Code**

					Percentile				
Area	SOC Code	Occupation	Workers	AvgWage	10th	25th	50th	75th	90th
South Dakota	'49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	1,040	\$20.03	\$14.77	\$16.60	\$19.07	\$23.24	\$27.55
South Dakota	'49-3041	Farm Equipment Mechanics and Service Technicians	630	\$18.57	\$12.97	\$15.54	\$18.35	\$21.89	\$24.18
South Dakota	'49-3042	Mobile Heavy Equipment Mechanics Except Engines	610	\$23.22	\$16.66	\$18.91	\$22.48	\$27.09	\$31.79
South Dakota	'49-9041	Industrial Machinery Mechanics	1,000	\$21.62	\$16.03	\$17.86	\$21.00	\$24.35	\$29.03

Data from the National Department of Labor positions the 2014 Mean hourly wage, depending on specific title, from \$17.94 to \$24.25. See Table Below:

Occupation Title	SOC	Number of Workers	Hourly Mean	Annual Mean	Wages at 10th Percentile	Wages at 25th Percentile	Wages at Median	Wages at 75th Percentile	Wages at 90th Percentile
Bus and Truck Mechanics and Diesel Engine Specialists	49-3031	243,080	\$ 21.71	\$45,160	\$13.52	\$16.69	\$20.98	\$ 26.31	\$ 31.42
Farm Equipment Mechanics and Service Technicians	49-3041	35,320	\$ 17.94	\$37,320	\$11.18	\$13.86	\$17.38	\$ 21.55	\$ 25.88
Mobile Heavy Equipment Mechanics Except Engines	49-3042	112,000	\$ 18.68	\$38,860	\$12.11	\$14.96	\$18.34	\$ 21.75	\$ 26.27
Industrial Machinery Mechanic	49-9041	313,880	\$ 24.25	\$50,440	\$15.10	\$18.63	\$23.38	\$ 28.97	\$ 35.32

## CIP Code

Farm Equipment Mechanics and Service Technicians: 47.0605: A program that prepares individuals to apply technical knowledge and skills to repair, service, and maintain diesel engines in vehicles such as automobiles, buses, ships, trucks, railroad locomotives, and construction equipment; as well as stationary diesel engines in electrical generators and related equipment.

## Appendix A – Program Course List and Semester Layout

### Transportation Emphasis

Semester	Course Title		Credits	Lec/Lab
<b>First Common First year</b>				
SSS 100	Student Success Seminar	AAS/Diploma	2	2/0
DM 116	Basic Electrical Theory		2	2/0
DM 117	Basic Electrical Lab		2	0/6
DM 120	Air Conditioning Theory		4	4/0
DM 121	Air Conditioning Lab		4	0/12
DM 224	Hydraulics Theory		2	2/0
DM 225	Hydraulics Lab		<u>2</u>	<u>0/6</u>
			18	
<b>Second Common First Year</b>				
DM 210	Diesel Theory		4	4/0
DM 211	Diesel Lab		4	0/12
DM 220	Fuel Systems Theory		2	2/0
DM 221	Fuel Systems Lab		2	0/6
CIS 101	Computer Essentials	AAS/Diploma	2	1/2
ENGL 101T	Composition-AAS Degree		3	3/0
	<b>OR</b>			
COMM 102	Communication in the Workplace-Diploma		<u>3</u>	<u>3/0</u>
			17	
<b>Third Transportation Emphasis</b>				
DM 230	Powertrain Theory		2	2/0
DM 231	Powertrain Lab		2	0/6
DM 118	Truck Electrical Systems Theory		2	2/0
DM 119	Truck Electrical Systems Lab		2	0/6
DM 114	Preventative Maintenance Theory		2	2/0
DM 115	Preventative Maintenance Lab		2	0/6
MATH 115	College Math	AAS/Diploma	3	3/0
SOC 150T	Social Problems	AAS/Diploma	<u>3</u>	<u>3/0</u>
			18	

<b>Semester</b>	<b>Course Title</b>	<b>Credits</b>	<b>Lec/Lab</b>
<b>Fourth</b>	<b>Transportation Emphasis</b>		
DM 214	Electronic Fuel Systems Theory	2	2/0
DM 215	Electronic Fuel Systems Lab	2	0/6
DM 130	Brakes Theory	2	2/0
DM 131	Brakes Lab	2	0/6
DM 132	Suspension Theory	2	2/0
DM 133	Suspension Lab	2	0/6
SPCM 101T	Fundamentals of Speech AAS/Diploma	3	3/0
PSYC 101T	General Psychology-AAS Degree	3	3/0
	<b>OR</b>		
PSYC 103	Psychology-Diploma	<u>3</u>	<u>3/0</u>
		18	
	<b>Total Credits:</b>	<b>71</b>	

## Ag/Construction Emphasis

Semester	Course Title	Credits	Lec/Lab
<b>First</b>	<b>Common First year</b>		
SSS 100	Student Success Seminar AAS/Diploma	2	2/0
DM 116	Basic Electrical Theory	2	2/0
DM 117	Basic Electrical Lab	2	0/6
DM 120	Air Conditioning Theory	4	4/0
DM 121	Air Conditioning Lab	4	0/12
DM 224	Hydraulics Theory	2	2/0
DM 225	Hydraulics Lab	<u>2</u>	<u>0/6</u>
		18	
<b>Second</b>	<b>Common First Year</b>		
DM 210	Diesel Theory	4	4/0
DM 211	Diesel Lab	4	0/12
DM 220	Fuel Systems Theory	2	2/0
DM 221	Fuel Systems Lab	2	0/6
CIS 101	Computer Essentials AAS/Diploma	2	1/2
ENGL 101T	Composition-AAS Degree	3	3/0
	<b>OR</b>		
COMM 102	Communication in the Workplace-Diploma	<u>3</u>	<u>3/0</u>
		17	
<b>Third</b>	<b>Ag/Construction Emphasis</b>		
ADM 230	Auxiliary Drive Theory	4	4/0
ADM 231	Auxiliary Drive Lab	4	0/12
ADM 234	Electro-Hydraulics	2	2/0
ADM 235	Electro-Hydraulics Lab	2	0/6
Math 115	College Math AAS/Diploma	3	3/0
SOC 150T	Social Problems AAS/Diploma	<u>3</u>	<u>3/0</u>
		18	
<b>Fourth</b>	<b>Ag/Construction Emphasis</b>		
ADM 238	Powertrain Theory	2	2/0
ADM 239	Powertrain Lab	2	0/6
ADM 242	Total Machine Control	4	4/0
ADM 243	Total Machine Control Lab	4	0/12
SPCM 101T	Fundamentals of Speech AAS/Diploma	3	3/0
PSYC 101T	General Psychology-AAS Degree	3	3/0
	<b>OR</b>		
PSYC 103	Psychology at Work-Diploma	<u>3</u>	<u>3/0</u>

**Total Credits:**

18  
71

## **Program Course List with Description**

### **Common First Semester**

#### **SSS 100 - Student Success Seminar**

2 Credit Hours

This course provides students with tools and techniques that will help them be successful in their program of study. The course focuses on interactive exercises which will help the learner identify personal strengths, learning styles, and support resources. Reading and study techniques will also be practiced.

#### **DM 116 - Basic Electrical Theory**

2 Credit Hours

This course will cover the basics of electrical theory. Major areas to be covered include: proper multi-meter usage, electron and electrical theory, basic electrical component function and operation, series circuits, parallel circuits, diode and transistor operation, and construction of simple circuits.

#### **DM 117 - Basic Electrical Lab**

2 Credit Hours

Hands-on experience in use of the multi-meter, measuring current, resistance, and voltage. Students will also construct and study the operation of basic electrical circuits.

#### **DM 120 - Air Conditioning Theory**

2 Credit Hours

This course will cover the basic air conditioning systems, components, operation and control systems used on heavy equipment, truck and implement air conditioning systems.

#### **DM 121 - Air Conditioning Lab**

2 Credit Hours

Hands-on experience in refrigerant recovery, system diagnosis and repair and system charging. Covers cooling, cycle theory and system component diagnosis, adjustment and replacement. Includes proper procedures for charging, recovering and recycling refrigerants.

### **DM 224 - Hydraulics Theory**

2 Credit Hours

This course will cover the theory and operation of fluid-power used to drive or actuate components or systems in heavy equipment, farming and over-the-road applications. Students will study the effects of pressure and volume as well as essential system components such as hydraulic pumps, actuators, valves and regulators.

### **DM 225 - Hydraulics Lab**

2 Credit Hours

Hands-on experience with fluid power systems and components as found on heavy equipment and farm implements.

## **Common Second Semester**

### **DM 210 - Diesel Theory**

4 Credit Hours

This course will cover the theory of diesel engine construction and operation, disassembly, component identification, sleeve and piston installation, main and rod bearing installation, engine assembly, timing, priming, adjustments, starting, testing, and engine diagnostics.

### **DM 211 - Diesel Lab**

4 Credit Hours

Hands-on lab covers diesel engine overhaul, including disassembly, component inspection and repair or replacement, testing and measurements for parts re-use, re-assembly, and start-up.

### **DM 220 - Fuel Systems**

4 Credit Hours

This course will cover the operational theory of mechanically and electronically controlled fuel systems and the procedures for troubleshooting and reprogramming the engine onboard computer systems.

### **DM 221 - Fuel Systems Lab**

3 Credit Hours

Hands-on experience in testing and programming engine fuel-delivery systems, fault diagnosis and adjustment.

### **CIS 101 - Computer Essentials**

2 Credit Hours

Designed to enable students with little or no computer experience to acquire a basic understanding of the personal computer. This course involves the study of computer basics such as hardware, operating systems, and file management, using the Internet for research, word processing, and spreadsheets.

### **ENGL 101T - Composition-AAS Degree**

3 Credit Hours

English Composition will help develop proficiency in writing concise, coherent essays, and in using correct English. Several modes of discourse will be explored and good grammar skills are emphasized. This course will improve the student's critical thinking skills as it provides students with practice in all stages of the writing process: planning, supporting, rewriting, analyzing, proofreading, and editing. This course will also require critical reading and writing.

### **COMM 102 - Communication in the Workplace-Diploma**

3 Credit Hours

Presents the elements of oral and written communication necessary to succeed in today's workplace. Emphasizes the written and oral skills needed for job search and employment. Hands-on activities and collaborative projects will provide students with comprehensive information addressing essential writing, speaking, and listening skills necessary to excel in today's workplace as well as the workplace of tomorrow.

## **Transportation Emphasis**

### **Third Semester**

#### **DM 230 - Powertrain Theory**

2 Credit Hours

Covers the theory of medium and heavy-duty truck transmissions, differentials, clutches, and drivelines. Students will study system troubleshooting and repair, component removal and installation, overhaul procedures, and adjustments. Also covers gear ratios, component power handling ratings, and proper driveline angles.

### **DM 231 - Powertrain Lab**

2 Credit Hours

Hands-on lab covers the removal, overhaul, and installation of medium and heavy-duty power train components. Students will work on single and double disc clutches, single and twin counter shaft transmissions, forward and rear differentials, axles, and drive lines. Work will be done on mock-up and live work according to the manufacturer's specifications.

### **DM 118 - Truck Electrical System Theory**

2 Credit Hours

Covers the operation and testing of heavy-duty starting and charging systems, control systems, 12 volt, and 12/24 volt systems, alternator and starter diagnosis and repair, schematic reading, proper use of test meters, tractor-trailer wiring systems, circuit operation of gauges, lights, and accessories.

### **DM 119 - Truck Electrical System Lab**

2 Credit Hours

Hands-on experience using mock-ups and live work, working with and testing heavy duty starting and charging systems, control systems, 12 volt, and 12/24 volt systems, alternator and starter diagnosis and repair, schematic reading, proper use of test meters, tractor-trailer wiring systems, circuit operation of gauges, lights, and accessories.

### **DM 114 - Preventive Maintenance Theory**

2 Credit Hours

Covers entry level technician inspection tasks designed to introduce students to correct procedures and practices of vehicle inspection. Major areas to be covered include: engine system, cab and hood, electrical/electronics, frame and chassis, and the suspension and steering systems.

### **DM 115 - Preventive Maintenance Lab**

2 Credit Hours

Hands-on experience in performing preventive maintenance inspections on live vehicles.

### **MATH 115 - College Math**

3 Credit Hours

A course covering the concepts and applications of mathematics, that includes: the arithmetic order of operations, percent problems, descriptive statistics and graphing, algebraic manipulations, solving linear equations, formula rearrangement, word problems, measurement, and applied plane and solid geometry. This course satisfies the institution's general education requirements for mathematics, but is not a transfer course.

### **SOC 150T - Social Problems**

3 Credit Hours

A sociological analysis of the causes and proposed solutions of contemporary social problems confronting society today. It includes an analysis of the significance of the problems and current policies and actions. The course is designed to encourage debate and to get students to consider different positions or viewpoints with regard to social issues.

**or**

### **SOC 250T - Marriage & the Family**

3 Credit Hours

Designed for all students, the purpose of the course is to develop an understanding of the social role of marriage and family living. Topics covered include courtship and preparation for marriage, conflict situations and adjustments between spouses, parent-child relationships, the family in the community, and disintegration of the family unit.

## **Fourth Semester**

### **DM 220 - Electronic Fuel Systems Theory**

2 Credit Hours

Covers the theory and operation of the various diesel fuel delivery systems used by the major engine companies. Covers the theory and operation of fuel injection pumps and nozzles as well as the tune-up procedures for Caterpillar, Cummins and Detroit Diesel engines.

### **DM 221 - Electronic Fuel Systems Lab**

2 Credit Hours

Hands-on study of the various diesel fuel delivery systems used by the major engine companies, as well as installing and timing injection pumps, testing and adjusting nozzles and learning and performing the recommended tune-up procedures for Caterpillar, Cummins, and Detroit Diesel engines.

### **DM 130 - Brakes Theory**

2 Credit Hours

Covers the design, construction, and operation of medium and heavy-duty truck hydraulic and air brake systems and components; including compressors, governors, air-lines, valves, controls, brake chambers, linkages, and foundation brakes.

### **DM 131 - Brakes Lab**

2 Credit Hours

Covers the overhaul of medium and heavy-duty hydraulic and air brake systems. Students will test, remove, repair, and/or replace the separate system components on actual customer trucks or school training mock-ups.

### **DM 132 - Suspension Theory**

2 Credit Hours

Covers truck steering systems, including manual and power steering gears, steering linkage and adjustment, alignment and overhaul of system components. Students will also study truck suspension systems, which will include single and multi-leaf springs, torsion bar, and air ride systems.

### **DM 133 - Suspension Lab**

2 Credit Hours

Hands-on lab covering troubleshooting, testing, adjusting, and overhauling medium and heavy-duty truck steering and suspension systems. Students will test, remove, repair, and/or replace the separate system components. They will also perform tire alignment checks and adjustments. All work will be done on actual customer trucks or school training mock-ups.

### **SPCM 101T - Fundamentals of Speech**

3 Credit Hours

Based on the study of communication theory as applied to public speaking. The goals are to improve the student's public speaking and listening skills. Experiences in the class range from developing speech outlines, researching topics, and practicing delivery techniques for an informative, persuasive, and panel discussion assignment.

### **PSYC 101T - General Psychology**

3 Credit Hours

Provides the student with an introduction to the basic psychological processes underlying human behavior. Topics include the functions of the brain and nervous system, the characteristics of sensation, perception and altered states of consciousness, learning and memory, the nature of thinking skills and intelligence, theories of motivation, emotion and personality, a survey of psychological disorders and approaches to therapy, social/interpersonal relations, and practical applications.

**or**

### **PSYC 103 - Psychology at Work**

3 Credit Hours

Explores how behavioral principles and practices of psychology can be applied in the workplace to help students understand situational as well as individual factors that contribute to workplace behavior. Helps students develop critical thinking skills as well as providing students opportunities for personal reflection in order to prepare them for the realities of the work world. Emphasizes the practical implications of issues such as customer and interpersonal relations, motivation, leadership, learning, development and problem-solving, and stress, attitudes and productivity. The course is designed to help students be successful in today's world of work.

# Ag/Construction Emphasis

## Third Semester

### **ADM 230 – Auxiliary Drive Systems Theory**

2 Credit Hours

This class will cover the theory of operation, identification of symbols, reading of schematics and diagnosis of problems and abnormalities in various agricultural and construction equipment.

### **ADM 231 –Auxiliary Drive Systems Lab**

2 Credit Hours

Students will gain hands-on experience using modern diagnostic equipment to effectively test and diagnose faults in drive systems used in various agricultural and construction equipment.

### **ADM 234 – Electro-Hydraulics Theory**

2 Credit Hours

This course will cover the concept of electrical and fluid power working together to operate, control, monitor and adjust systems and sub-systems used in various agricultural and construction equipment. Advanced fluid power and electrical control concepts are introduced along with diagnosis and trouble-shooting using high-technology tools.

### **ADM 235 – Electro-Hydraulics Lab**

2 Credit Hours

Students gain hands-on experience using electrical and fluid power working together to operate, control, monitor and adjust systems and sub-systems used in various agricultural and construction equipment. Advanced fluid power and electrical control concepts are introduced along with diagnostics and trouble-shooting using high-technology tools.

### **MATH 115 - College Math**

3 Credit Hours

A course covering the concepts and applications of mathematics, that includes: the arithmetic order of operations, percent problems, descriptive statistics and graphing, algebraic manipulations, solving linear equations, formula rearrangement, word problems, measurement, and applied plane and solid

geometry. This course satisfies the institution's general education requirements for mathematics, but is not a transfer course.

### **SOC 150T - Social Problems**

3 Credit Hours

A sociological analysis of the causes and proposed solutions of contemporary social problems confronting society today. It includes an analysis of the significance of the problems and current policies and actions. The course is designed to encourage debate and to get students to consider different positions or viewpoints with regard to social issues.

**or**

### **SOC 250T - Marriage & the Family**

3 Credit Hours

Designed for all students, the purpose of the course is to develop an understanding of the social role of marriage and family living. Topics covered include courtship and preparation for marriage, conflict situations and adjustments between spouses, parent-child relationships, the family in the community, and disintegration of the family unit.

## **Fourth Semester**

### **ADM 238      Powertrain Theory**

3 Credit Hours

This course will cover the theory of drive methods used to power systems and sub-systems external of the main drive train. Included will be: power take-off (PTO), hydraulic control and electro-hydraulically controlled implements.

### **ADM 239      Powertrain Drive Lab**

3 Credit Hours

Students gain hands-on experience working with drive methods used to power systems and sub-systems external of the main drive train. Included will be power take-off (PTO), hydraulic control and electro-hydraulically controlled implements

### **ADM 242      Total Machine Control Theory**

4 Credit Hours

This course will cover diagnostic concepts and techniques using factory software and other tools to trouble-shoot and diagnose faults and abnormalities in computer-controlled systems. Concepts in networking and multi-bus systems will be introduced and explored.

### **ADM 243 Total Machine Control Lab**

4 Credit Hours

Students will employ hands-on diagnostic concepts and techniques using factory software and other tools to trouble-shoot and diagnose faults and abnormalities in computer-controlled systems. Concepts in networking and multi-bus systems will be applied.

### **SPCM 101T - Fundamentals of Speech AAS/Diploma**

3 Credit Hours

Based on the study of communication theory as applied to public speaking. The goals are to improve the student's public speaking and listening skills. Experiences in the class range from developing speech outlines, researching topics, and practicing delivery techniques for an informative, persuasive, and panel discussion assignment.

### **PSYC 101T - General Psychology-AAS Degree**

3 Credit Hours

Provides the student with an introduction to the basic psychological processes underlying human behavior. Topics include the functions of the brain and nervous system, the characteristics of sensation, perception and altered states of consciousness, learning and memory, the nature of thinking skills and intelligence, theories of motivation, emotion and personality, a survey of psychological disorders and approaches to therapy, social/interpersonal relations, and practical applications.

### **PSYC 103 - Psychology at Work-Diploma**

3 Credit Hours

Explores how behavioral principles and practices of psychology can be applied in the workplace to help students understand situational as well as individual factors that contribute to workplace behavior. Helps students develop critical thinking skills as well as providing students opportunities for personal reflection in order to prepare them for the realities of the work world. Emphasizes the practical implications of issues such as customer and interpersonal relations, motivation, leadership, learning, development and problem-solving, and stress, attitudes and productivity. The course is designed to help students be successful in today's world of work.

**Appendix B – Letters of Support**