WESTERN DAKOTA TECH

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February 2019

Nick Wendell
South Dakota Board of Technical Education
800 Governors Drive
Pierre, SD 57501-2291

Dear Nick:

Please accept this letter as notification that Western Dakota Tech is modifying its offerings for the Fall 2019 semester. We will begin offering two blended AAS programs, comprised of courses from existing programs. These changes were developed from meetings with industry representatives over the course of the last year. The new blended programs will be:

- Diesel Technology - Industrial Maintenance
  - Associate of Applied Science blended program option from Diesel Technology, Electrical Trades, Precision Machining, and Welding & Fabrication
- Environmental Engineering Technician – Aquaponics
  - Associate of Applied Science blended program option from Environmental Engineering Technician and Electrical Trades

These changes will help WDT to better serve students and local industry needs. The attached documents fully describes the background and rationale for these new blended programs.

The CIP code for Diesel Technology – Industrial Maintenance will be 47.0303.

The CIP code for Environmental Engineering – Aquaponics will be 01.0308.

Please let me know if you have questions.

Respectfully,

Ann Bolman, Ed.D.

Dr. Bolman
President

WESTERN DAKOTA TECH

Presented to the SD Board of Technical Education February 2019

For Implementation Fall 2019

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# DIESEL TECHNOLOGY - INDUSTRIAL MAINTENANCE

## EXECUTIVE SUMMARY

Western Dakota Tech's Diesel Technology program has teamed up with local industry partners to enhance an educational opportunity in industrial production. WDT would like to carry this educational opportunity forward based on already established courses in a combination of successful programs, providing students with knowledge and skills needed in a high demand local industry.

Western Dakota Tech currently offers programs in Diesel Technology, Welding & Fabrication, Precision Machining and Electrical Trades that will be able to provide curriculum support and expertise, complementing the required skills of an Industrial Maintenance Technician.

## IDENTIFICATION AND DESCRIPTION OF THE PROGRAM

Western Dakota Tech requests approval to offer a blended program for an Associate of Applied Science degree in Diesel Technology – Industrial Maintenance. This blended program will offer courses from already established and successful programs (Diesel Technology, Electrical Trades, Welding and Precision Machining) to create a combined degree option that will meet industry needs for skilled workers.

This blended program will be comprised of educational components including: diesel technology, powertrains, preventative maintenance, hydraulics, turning and milling theory, electrical motor fundamentals, programmable logic controllers, and basic welding. This program also will provide education and training in soft skills such as workplace communication, math and basic computer skills.

Graduates of this program will have opportunities for career choices including:

- Operations Foreman
- Mobile Maintenance Mechanic
- Industrial Technician
- Process Technician
- Crusher Maintenance Technician
- Mine Maintenance Mechanic
- Maintenance Mechanic Supervisor
- General Maintenance & Repair Technician

Students will work and study in a learning environment that will focus on problems, critical questions, and real-world case studies forming the basis for a comprehensive understanding. This blended degree option is a 21-month or four-semester curriculum with 68 credits.

## OBJECTIVES AND PURPOSE OF THE PROGRAM

The primary objective of this blended program is to prepare students with the necessary knowledge, skills, and behaviors to be successful. This will be met by providing a solid curriculum that includes classroom and real-world experience.

This objective will be met by providing an educational background that prepares graduates to be employed immediately upon completion of this blended degree program.

Upon completion, graduates will have basic skills to:

- Maintain a safe working environment
- Troubleshoot and diagnose mechanical drives and hydraulic systems
- Verbalize basic components of industrial electricity and motor controls
- Demonstrate proper and effective use of current technology tooling commonly used in industry
- Apply knowledge and skills in diagnosis and repair
- Implement an appropriate record keeping system
- Demonstrate basic principles of welding and precision machining
- Understand production principles

## METHODS OF OBTAINING THE OBJECTIVES OF THE PROGRAM

Upon receipt of the South Dakota Board of Technical Education approval, Western Dakota Tech will begin developing marketing and recruitment strategies to fill the initial Fall 2019 cohort of 24 students. A marketing campaign to recruit students will include a comprehensive media mix. Western Dakota Tech will provide faculty resources to develop curriculum, develop course schedules, and establish an advisory board who will routinely review program curriculum, statistics, resources, and overall continued health of the program.

Local industry is supportive of this program and will be instrumental in the initial development phase as well as its continued success. The letters of support acknowledge the industry's commitment of ongoing support.

Western Dakota Tech provides assurance that it possesses the resources and staff necessary to:

- Develop marketing materials and recruit students
- Recruit and retain qualified staff and instructors
- Develop and administer budgets
- Make available textbooks and instructional resources
- Provide career counseling to students
- Evaluate programs and staff
- Assist students with job placement
- Provide services to non-traditional students
- Provide classrooms, equipment, and supplies

## DESCRIPTION OF LABOR MARKET DEMAND OF THE UNITED STATES, SOUTH DAKOTA, STUDENT NEEDS AND INDUSTRY SUPPORT

### National Data

| **National Bureau of Labor Statistics 2016 - 2026** | | | |
|---|---|---|---|
| Position | 2016 | 2026 | 2016 - 2026 % |
| Industrial Machinery Mechanics | 476,100 | 508,200 | 7% |

| | | | |
|---|---|---|---|
| Diesel Service Technicians and Mechanics | 478,800 | 304,600 | 9% |
| Network and Computer Systems Administrators | 391,300 | 415,300 | 6% |
| Electricians | 666,900 | 726,500 | 9% |

## State / Regional Data

| **SD Bureau of Labor Statistics 2016 - 2026** | | | |
|---|---|---|---|
| Position | 2016 | 2026 | 2016 - 2026 % |
| Industrial Machinery Mechanics | 1,222 | 1,458 | 1.78% |
| Bus and Truck Mechanics and Diesel Engine Specialists | 1,024 | 1,132 | 1.01% |
| Network and Computer Systems Administrators | 1,656 | 1,779 | .72% |
| Electricians | 2,288 | 2,383 | 4.15% |

## Student Need

This program will provide students with an opportunity to enter an emerging industry that has many areas for growth, and training that meets industry need. The majority of graduates will enter employment as an entry-level Industrial Maintenance Technician.

## Industry Support

Western Dakota Tech has consulted with multiple industry representatives in the western South Dakota and surrounding region, and has received a very strong level of support. Industry leaders have indicated that there is growth for this field based on our geographic location and the high number of active mines in the surrounding area.

## POPULATION SERVED BY THE PROGRAM

This program is available to any applicant who successfully completes the Western Dakota Tech admissions requirements, including Dual Enrollment students. Western Dakota Tech does not discriminate in its educational programs on basis of race, color, creed, religion, age, sex, disability, national origin or ancestry. The program will draw its students from South Dakota and surrounding states, and the opportunities for employment will favor the same geographical area.

## PROGRAM CAPACITY

| Starting Semester | Delivery Format | Cohort Capacity |
|---|---|---|
| Fall 2019 | Traditional Day | 24 |

## ENTRY AND EXIT POINTS

Entry point: Fall Semester 2019

Exit point: First graduating cohort in Spring 2021 with an A.A.S. degree in Diesel Technology – Industrial Maintenance.

## PROGRAM DUPLICATION

Western Dakota Tech is proposing this blended program option to meet regional industry needs. There is currently no similar programs in South Dakota and the needs of industry in western South Dakota and the region are growing.

Montana – 1 program; Flathead Valley Community College

Nebraska – 3 programs; Metropolitan Community College, Northeast Tech, and Central Community College

North Dakota – 1 similar program; Bismarck State College

Wyoming – 1 program; Western Wyoming Community College

## CIP CODE: 47.0303

## WAGE FACTOR

**National Wage Factor**

| **National Bureau of Labor Statistics 2016 - 2026** | |
|---|---|
| Position | 2017 Median Pay |
| Industrial Machinery Mechanics | $51,440 |
| Diesel Service Technicians and Mechanics | $46,360 |
| Network and Computer Systems Administrators | $81,100 |
| Electricians | $54,110 |

**South Dakota Wage Factor**

| SD Bureau of Labor Statistics 2016 - 2026 | | | |
|---|---|---|---|
| Position | 25th % | Mean | 75th % |
| Industrial Machinery Mechanics | $37,938 | $45,791 | $50,725 |
| Bus and Truck Mechanics and Diesel Engine Specialists | $36,138 | $43,677 | $52,492 |
| Network and Computer Systems Administrators | $51,534 | $61,837 | $72,278 |
| Electricians | $36,265 | $45,951 | $55,572 |

## FACILITY / SPACE REQUIREMENTS

No facility change will be required for this blended program. The majority of academic coursework is currently established and part of already successful programs. Current lab space from the Diesel Technology, Electrical Trades, Welding and Precision Machining programs will be utilized.

## PROJECTED BUDGET

| Projected Expenses | Year 1 | Year 2 | Year 3 |
|---|---|---|---|
| Salaries | - | - | - |
| Adjunct Instructor Expense | - | 8,000 | 10,000 |
| Benefits | - | - | - |
| Staff Travel | 1,000 | 1,000 | 1,000 |
| Instructional Materials and Software | 5,000 | 2,000 | 2,000 |
| Equipment Purchases | 50,000 | - | - |
| Software/Books/Fees | 2,000 | 2,000 | 2,000 |
| | **$ 58,000** | **$ 13,000** | **$ 15,000** |

## CURRICULUM DESIGN

Western Dakota Tech designed a tentative curriculum after an extensive review of curriculum searches, academic review of required skills, and discussion with industry professionals. The curriculum is shown in Appendix A.

# APPENDIX A – INDUSTRIAL MAINTENANCE TECH PROGRAM CURRICULUM

## A.A.S. Degree Course Sequence

| First Semester | | CR |
|---|---|---|
| CIS 105 | Microcomputer Software Applications | 3 |
| DT 110 | Heavy Duty Powertrains | 4 |
| DT 115 | Preventative Maintenance | 3 |
| MACH 115 | Turning Theory and Operations I | 3 |
| MACH120 | Milling Theory and Operations I | 3 |
| | **Total Credit Hours** | **16** |

| Second Semester | | CR |
|---|---|---|
| DT 120 | Diesel Engines I | 5 |
| ENGL 106 | Workplace Communications I | 3 |
| IEL XXX | Introduction to Electricity | 4 |
| IEL 135 | Basic Electrical Materials and Devices | 1 |
| MATH 100 | Elementary Algebra ***or higher*** | 3 |
| WDM 100 | Welding and Fabrication for General Applications | 2 |
| | **Total Credit Hours** | **18** |

| Third Semester | | CR |
|---|---|---|
| DT 215 | Vehicle Electricity & Electronic Systems | 4 |
| DT 220 | Vehicle Electricity & Electronic Systems Lab | 6 |
| IEL 217 | Computer Hardware Installation / Troubleshooting | 4 |
| IEL 226 | Electrical Motor Fundamentals and Maintenance | 1 |
| PSYC 103 | Human Relations in the Workplace | 3 |
| | **Total Credit Hours** | **18** |

| Fourth Semester | | CR |
|---|---|---|
| DT 210 | Hydraulics | 3 |
| DT 240 | Diesel Engines II | 4 |
| DT 245 | Diesel Engines II Lab | 6 |
| SOC 100 | Introduction to Sociology | 3 |
| | **Total Credit Hours** | **16** |

| First Semester | | Credits |
|---|---|---|
| **CIS 105** | **Microcomputer Software Applications**<br>This course is an introductory course in software applications which includes basic technical concepts as well as hands-on experience. The utility of the computer is demonstrated by introducing Windows, word processing, spreadsheet, database, and presentation software to the student. | 3 |
| **DT 110** | **Heavy Duty Powertrains**<br>This course introduces the basic principles of transmissions, differentials, and drivetrains. Students will understand the operation of all drivetrain components and the procedure for disassembly, repair, and the reassembling of each component. Included are how to perform failure analysis and how to troubleshoot drivetrain problems. Additional areas included are automatic transmissions, agriculture transmissions, and power shift transmissions. | 4 |
| **DT 115** | **Preventative Maintenance**<br>This course encompasses the characteristics and benefits of a well-planned maintenance program. This course will cover the tools and procedures needed to perform a proper preventative maintenance inspection (PMI). | 3 |
| **MACH115** | **Turning Theory and Operations I**<br>This course introduces the metal cutting lathe, its care, setup, and use as applied to current industry practices. Topics addressed will include lathe safety, machine setup, and carrying out the basic lathe operations of turning, drilling, boring, facing, and thread cutting. | 3 |

| | | |
|---|---|---|
| **MACH120** | **Milling Theory and Operations I**<br>The vertical milling machine and its set-up and operation are introduced in this course. Students will learn milling machine safety, tramming of the mill, and the use of edge finders and dial indicators to locate part features and align work. Use of the Cartesian coordinate system, drilling, surfacing, slotting, pocketing and contour milling procedures will be covered. | 3 |
| | **TOTAL CREDITS** | **16** |
| | | |
| | **Second Semester** | **Credits** |
| **IEL xxx** | **Introduction to Electricity**<br>This course introduces the fundamentals of AC/DC circuits. It includes important concepts related to electrical safety, electrical quantities, ohm's law, series/parallel circuits, common electrical symbols and electrical system troubleshooting. | 4 |
| **IEL 135** | **Basic Electrical Materials and Devices**<br>This course is designed to cover essential electrical materials, identify the industry's commonly used materials, and understand its terminology. | 1 |
| **DT 120** | **Diesel Engines I**<br>This course teaches the diagnostic and repair skills necessary for diesel engine work. All of the following areas are covered: diesel engine design, overhaul, tune-up, fuel systems, troubleshooting, and repair. | 5 |
| **ENGL106** | **Workplace Communications**<br>This course presents the basic principles and forms of written communication in the workplace. Instruction leads students through the planning tasks, identifying audiences, and gathering information. More emphasis is on reports. | 3 |
| **MATH 100** | **Elementary Algebra or higher**<br>This course prepares students for college-level mathematics. Topics generally include: basic properties of real numbers, exponents and radicals, rectangular coordinate geometry, solutions to linear equations, inequalities, and polynomials. | 3 |
| **WDM 100** | **Welding and Fabrication for General Applications**<br>This course teaches the student safety procedures and familiarization with MIG set-up operations and welding in flat, horizontal, vertical, and overhead positions. In addition, the use and care of oxyacetylene welding and the cutting torch are covered. | 2 |
| | **TOTAL CREDITS** | **18** |
| | | |
| | **Third Semester** | **Credits** |
| **DT 215** | **Vehicle Electricity & Electronic Systems**<br>This course is designed to provide the students with knowledge of shop safety while learning the electronics background necessary to understand and diagnose the sophisticated electronic systems of the modern automobile. | 4 |
| **DT 220** | **Vehicle Electricity & Electronic Systems Lab**<br>This course is designed to provide the students with knowledge of shop safety while learning hands-on vehicle electrical systems. | 6 |
| **IEL 217** | **Computer Hardware Installation/Troubleshooting**<br>This course will provide a basic understanding of how Special Electrical Systems work and provide an opportunity for students to obtain the knowledge and skills necessary to service these systems and supported peripherals. Upon conclusion of this course, students will be able to understand basic components of Special Systems as well as upgrading and troubleshooting. Special Systems may include but not limited to: Computer systems, Electronic Access control, Security camera systems etc. | 4 |
| **IEL 226** | **Electrical Motor Fundamentals and Maintenance**<br>This course involves a study of the operational theory and construction of AC and DC motors. It is important for the electrician to have an understanding of motor principles and motor construction in order to facilitate proper motor installation and | 1 |

| | | |
|---|---|---|
| | troubleshooting. This course should be taken concurrently with IEL 223 Electric Motor Lab. | |
| **PSYC103** | **Human Relations in the Workplace**<br>This course is designed to provide the student with an awareness of psychology. Students will acquire knowledge of the origins and scope of the field, research methods, basic concepts and specialized language of the field of psychology. | 3 |
| | **TOTAL CREDITS** | **18** |
| | | |
| | **Fourth Semester** | **Credits** |
| **DT 210** | **Hydraulics**<br>This course teaches fluids and how they are utilized to transmit energy and force. The maintenance and repair of pumps, actuators, valves, accumulators, cylinders, and motors are included. Students will learn how to maintain and service reservoirs, coolers, and filters. In addition to maintaining a hydraulic system, students will learn to read hydraulic schematics and troubleshoot hydraulic problems. | 3 |
| **DT 240** | **Diesel Engines II**<br>This course is designed to provide the student with the necessary instructions to diagnose and repair ignition-, fuel-, and emission-related drivability problems. | 4 |
| **DT 245** | **Diesel Engines II Lab**<br>This course is designed to provide the student with the necessary hands-on instructions to diagnose and repair ignition-, fuel-, and emission-related drivability problems. | 6 |
| **SOC100** | **Introduction to Sociology**<br>This course is designed to develop the sociological thinking of students. The multifaceted nature and depth of sociology will be presented in such areas as culture, socialization, ethnicity, and political systems. | 3 |
| | **TOTAL CREDITS** | 16 |
| | **TOTAL CREDITS** | **68** |

## APPENDIX B – LETTERS OF SUPPORT

Coeur Wharf Mine