



HVAC Technology

State Submission

Mark Wilson, President

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HVAC TECHNOLOGY PROGRAM

EXECUTIVE SUMMARY

Western Dakota Technical Institute is seeking approval to create a Diploma program in HVAC Technology.

Labor market information for the state indicates that the demand for workers in the HVAC field is strong now and in the future. Through 2020, the number of heating, air conditioning, and refrigeration technicians is expected to grow by 23.3 percent, according to the South Dakota Labor Market Information Center (LMIC).

Graduates of this program will be able to seek employment in a variety of settings, including HVAC companies and public entities. Graduates also will—eventually—have the opportunity to start their own HVAC business.

Western Dakota Technical Institute will market this program as HVAC Technology. The diploma is a nine-month or two-semester curriculum.

IDENTIFICATION AND DESCRIPTION OF THE PROGRAM

The Heating, Ventilation and Air Conditioning graduate will be able to design residential and light commercial central heating and air conditioning systems according to load requirements. Graduates will be able to install, troubleshoot and repair residential and light commercial heating and air conditioning equipment; design, fabricate and install forced air and hot water distribution systems using sheet metal, duct board, copper tubing, Wirsbo tubing, Pex tubing, PVC and other accepted materials; install a wide range of oil and gas boilers and forced-air furnaces; and design, fabricate and install home and light commercial ventilation systems, including both exhaust and fresh air make-up exchangers. Students also will prepare for and take the universal HVAC certification exam so they are qualified to handle all types of refrigerant upon graduation.

OBJECTIVES AND PURPOSE OF THE PROGRAM

The primary objective of the HVAC Technology program is to prepare students with the necessary skills to be successful in the heating, air conditioning, and refrigeration field. Students will take coursework in HVAC theory, HVAC installation, plan and print reading, and other technical skills. This program also will provide education and training in soft skills such as communication and math.

The aim of this program is to provide students a solid foundation in HVAC technology. According to the [Occupational Outlook Handbook](#), heating, air conditioning, and refrigeration mechanics and installers typically do the following:

- *Follow blueprints or other design specifications to install or repair HVACR systems*
- *Connect systems to fuel and water supply lines, air ducts, and other components*
- *Install electrical wiring and controls and test for proper operation*
- *Inspect and maintain customers' HVACR systems*
- *Test individual components to determine necessary repairs*
- *Repair or replace worn or defective parts*

Heating and air conditioning systems control the temperature, humidity, and overall air quality in homes, businesses, and other buildings. By providing a climate controlled environment, refrigeration systems make it possible to store and transport food, medicine, and other perishable items.

Although trained to do all three, HVACR technicians sometimes work strictly with heating, air conditioning, or refrigeration systems. They also may specialize in certain types of HVACR equipment, such as water-based heating systems, solar panels, or commercial refrigeration. Depending on the task, HVACR technicians use many different tools. For example, they often use screwdrivers, wrenches, pipe cutters and other basic handtools when installing systems. To test or install complex system components, technicians may use more sophisticated tools, such as carbon monoxide testers, voltmeters, combustion analyzers, and acetylene torches.

When working on air conditioning and refrigeration systems, technicians must follow government regulations regarding the conservation, recovery, and recycling of refrigerants. This often entails proper handling and disposal of fluids.

Some HVACR technicians sell service contracts to their clients, providing regular maintenance of heating and cooling systems.

The program will articulate appropriate high school credits whenever possible, and there could be dual enrollment possibilities for high school students.

PROGRAM OUTCOMES

The HVAC Technology graduate will be able to:

- Exhibit safety practices and procedures
- Layout and install ductwork
- Design and fabricate ductwork
- Perform HVAC system installation, maintenance, and troubleshooting
- Demonstrate professionalism and related soft skills
- Layout and wire electrical schematics
- Pass the Universal HVAC certification exam

METHODS OF OBTAINING THE OBJECTIVES OF THE PROGRAM

The program will include classroom and laboratory instruction, guest speakers, and internship opportunities.

The HVAC Technology program will work closely with an industry advisory board composed of representatives who are from HVAC businesses, public entities, and others in the field. The Advisory Board will approve the curriculum, discuss and recommend equipment purchases, and assist in forming partnerships to help WDT with innovative curriculum, internships, and presentations.

POPULATION SERVED BY THE PROGRAM

The HVAC Technology program will be available to all interested individuals who successfully meet the WDT admissions criteria established for the program. The program will be open to full-time and part-time students. All applicants must be high school graduates and take an admissions test to establish reading, writing, and math abilities. No restriction will be made regarding race, creed, gender or age. The program will draw students primarily from South Dakota. The opportunities for employment in the field will be primarily in South Dakota.

PROJECTED THREE-YEAR BUDGET

This program will share a full-time program coordinator. Adjunct instructors with industry experience would serve as instructor for courses not taught by program coordinator. The projected budget is as follows:

Expenses	Year One	Year Two	Year Three
Instructors	\$66,152.00	\$68,136.00	\$70,180.00
Equipment	\$25,000.00	\$25,000.00	\$10,000.00
Supplies	\$10,000.00	\$10,000.00	\$10,000.00

PROGRAM COMPETENCIES AND ENTRY AND EXIT POINTS

Entry point: Fall Semester

Exit point: Graduation with a diploma in HVAC Technology.

PROGRAM DUPLICATION

Western Dakota Tech is proposing this program to meet regional industry needs for heating, air conditioning, and refrigeration mechanics and installers. While there are other HVAC-related programs in South Dakota, they are not meeting the needs of industries in western South Dakota.

CURRICULUM DESIGN

See Appendix A for Curriculum Sequence.

WAGE FACTOR

The median annual wage of heating, air conditioning, and refrigeration mechanics and installers was \$42,530 in May 2010. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$26,490, and the top 10 percent earned more than \$66,930.

In May 2010, median annual wages in industries employing the most heating, air conditioning, and refrigeration mechanics and installers were as follows:

Hardware, plumbing, and heating equipment wholesalers	\$46,540
Direct selling establishments	\$44,210
Commercial and industrial machinery and equipment repair	\$43,460
Building equipment contractors	\$40,630

Apprentices usually earn about half of the wage paid to experienced workers. As they gain experience and improve their skills, they receive periodic raises until they reach the wage of experienced workers.

South Dakota Wage Estimates for SD, Rapid City, and West					Percentile				
AREA	SOC CODE	Occupation	Workers	Avg. Wage	10 th	25 th	50 th	75 th	90 th
Statewide	49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	710	20.11	13.25	15.49	18.82	23.20	28.61
Rapid City MSA	49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	110	19.02	14.50	16.30	18.38	21.83	25.72
West	49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	N/A	16.68	12.71	13.94	15.96	17.96	24.54

Data derived from SD Department of Labor http://dlr.sd.gov/lmic/menu_occupational_wages.aspx

EMPLOYMENT OUTLOOK

South Dakota Occupational Projections 2010-2020

SOC	SOC Title	2010	2020	Growth	% Growth	Average Annual Demand
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,010	1,245	235	23.3	40

Data derived from SD Department of Labor http://dlr.sd.gov/lmic/occupation_projections.aspx

On a national level (retrieved from the Occupational Outlook Handbook):

Employment of heating, air conditioning, and refrigeration mechanics and installers is expected to grow 34 percent from 2010 to 2020, much faster than the average for all occupations. Commercial and residential building construction will drive employment growth as the construction industry continues to recover from the 2007-09 recession. The growing number of sophisticated climate-control systems is also expected to increase demand for qualified HVACR technicians.

Climate-control systems generally need replacement after 10 to 15 years. A large number of recently constructed homes and commercial buildings will need replacement climate-control systems by 2020, spurring demand for technicians.

The growing emphasis on energy efficiency and pollution reduction will require more HVACR technicians as climate-control systems are retrofitted, upgraded, or replaced entirely. Regulations prohibiting the discharge and production of older types of refrigerant pollutants also will result in the need to modify or replace many existing air conditioning systems.

Heating, Air Conditioning, Ventilation, and Refrigeration Maintenance Technology/Technician
CIP Code: 47.0201

APPENDIX A – HVAC Technology PROGRAM CURRICULUM

Diploma Course Sequence

First Semester		Credits
MATH104	<p>Technical Math This course includes real numbers and variable expressions, first-degree equations, polynomials, factoring, rational expressions, rational exponents and radicals, geometry, quadratic equations and trigonometry. This course is designed for students who are preparing for technical careers. It stresses a working knowledge of applied mathematical concepts. The practice problems are applications from various technical fields but do not require prior knowledge of the technical applications. Problems are selected to help develop an understanding of where and how mathematics is used in the various fields of employment. PREREQUISITES: High School Math and a COMPASS Score in Pre-Algebra Domain of 40 or higher.</p>	3
HVAC120	<p>Electrical Applications for HVAC Covers general knowledge of basic electrical applications used by industry. Use of basic electrical equipment including multimeters is stressed. Topics include current, voltage, resistance, symbols and basic AC and DC circuits.</p>	3
HVAC125	<p>HVAC Installation I Provides a comprehensive introduction to designing and installing HVAC systems. Students learn sheet metal fabrication and installation, basic principles of heat transfer, and the basic refrigeration cycle applied to air conditioning.</p>	7
HVAC130	<p>HVAC Plan and Print Reading Covers the fundamentals of blueprints and floor plans used for common layouts. Includes dimensions, specifications and interpretation of details found on typical sets of plans.</p>	2
CIS105	<p>Microcomputer Software Applications 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. (A computer course is required of all students at WDTI; students may take CIS 105 or CIS 106).</p>	3
TOTAL CREDITS		18
Second Semester		Credits
PSYC103	<p>Human Relations in the Workplace Success in the world of work requires not only the ability to perform according to the requirements of the position, but also the ability to adjust and get along with others. The purpose of this course is to help students grasp the importance of human relations skills in both their</p>	3

	personal and career lives. It will introduce students to the skills necessary to create and maintain positive relationships and interactions in the workplace.	
ENGL102	Career Communications This course covers the communication skills required for success during the job hunt and on the job.	2
HVAC135	Electrical Applications for HVAC II Continues the coverage of electrical applications used by HVAC installers. Students learn a more thorough explanation of voltage and current, including basic measuring techniques and safety concerns. Motors and transformers in their typical applications are also included.	3
HVAC140	Pipe Joining Methods Covers the correct techniques to use when joining pipes. Students learn correct techniques for making a solder joint, a brazed joint and a threaded joint. Alternative techniques are also taught, including flare, crimp and compression.	3
HVAC145	HVAC Installation II Provides advanced instruction on designing and installing HVAC systems. Students also will go into more depth on topics such as refrigerant handling procedures, gas piping and sizing, chimney and vent calculations, and the uniform mechanical code. This course also includes preparation for and completion of the universal HVAC certification exam. The examination requires an additional fee.	7
	TOTAL CREDITS	18

APPENDIX B – LETTERS OF SUPPORT

Action Mechanical, Inc.

PLUMBING • HEATING • SHEET METAL • AIR CONDITIONING

1856 Lombardy Drive • P.O. Box 880
Rapid City, SD 57709-0880

Phone: (605) 348-5212
Fax: (605) 348-6984

October 24, 2012

Mr. Mark Wilson, President
Western Dakota Tech
800 Mickelson Drive
Rapid City, SD 57703

Mr. Wilson,

As a Black Hills area business and employer, we would be interested in a HVAC Technology program offered by Western Dakota Tech.

As a mechanical contractor, we employ many HVAC professionals who work on large commercial projects or who provide services to individual residential customers. The HVAC industry is an ever-growing business with constant technical changes and can flourish with well-trained employees educated in the latest technologies.

We are always seeking qualified employees, who have received formal training and education. We support efforts to increase structured training in our area, there are currently no local certificate programs to formally train those students who want to become HVAC professionals. These skills are in high demand. Job security, plus pay and benefits await these professionals.

We hope this HVAC program can be developed and our company would support your efforts to inform policy makers and the public of the great career opportunities available to graduates of your program.

Thank you.

Sincerely,



Rochelle Sheesley-Johnson, President





SOUTH DAKOTA ASSOCIATION

OFFICE OF THE
EXECUTIVE VICE PRESIDENT
ken.phcc@midconetwork.com

OF PLUMBING • HEATING • COOLING CONTRACTORS, INC.

(605) 271-7255 • 1-800-640-7422 • 1000 N. WEST AVE #200 • SIOUX FALLS, SD 57104

October 24 , 2012

Mr. Mark Wilson, President
Western Dakota Tech
800 Mickelson Drive
Rapid City, SD 57703

Dear Mr. Wilson,

The South Dakota Association of Plumbing, Heating, Cooling Contractors is interested in a possible HVAC Certificate program at Western Dakota Tech.

The South Dakota PHCC represents about 70 contractor members in South Dakota and Sioux City, Iowa. Our members range in size from 150 employees to two or three employees.

Our members constantly seek qualified applicants and cannot find sufficient candidates to meet the demand. Contractors in the Black Hills region would certainly welcome an appropriate training program in western South Dakota. Our industry is also facing a chronic, growing shortage of qualified professionals who have obtained appropriate training.

We offer this letter of support for a formal HVAC Certificate curriculum offered by Western Dakota Tech. We would further help with guest speakers and supplemental information for the program and its students.

Thank you for your efforts to advance the p-h-c industry. We look forward to the development of this program.

Sincerely,

Ken Melius
Executive Vice President

WOLFF'S PLUMBING & HEATING, INC.

614 South 32nd Street - PO Box 97 - Spearfish, SD 57783
Ph - (605) 642-5755 - Fax - (605) 642-5757

October 23, 2012

Mr. Mark Wilson, President
Western Dakota Tech
800 Mickelson Drive
Rapid City, SD 57703

Dear Mr. Wilson,

As a Black Hills area business and employer, we are interested in a possible HVAC Certificate program offered by Western Dakota Tech.

As a mechanical contractor, we employ many HVAC professionals who work on large commercial projects or who provide services to individual residential customers. The HVAC industry is a fast-changing industry with constant technical changes requiring educated and well-trained employees who can master these disciplines.

We are always seeking qualified employees, and employees who have received formal training and education are an asset to our business. The P-H-C industry faces a critical shortage of trained employees entering our industry—both locally and nationally. We support efforts to increase structured training in our geographic area, there are currently no local programs to formally train those students who want to become HVAC professionals. These skills are in high demand. Job security, plus pay and benefits, are above average for these professionals.

I hope this HVAC program can be developed and our company would support your efforts to inform policy makers and the public of the great career opportunities available to graduates of your program.

Thank you.

Sincerely,



Greg Hartman
President