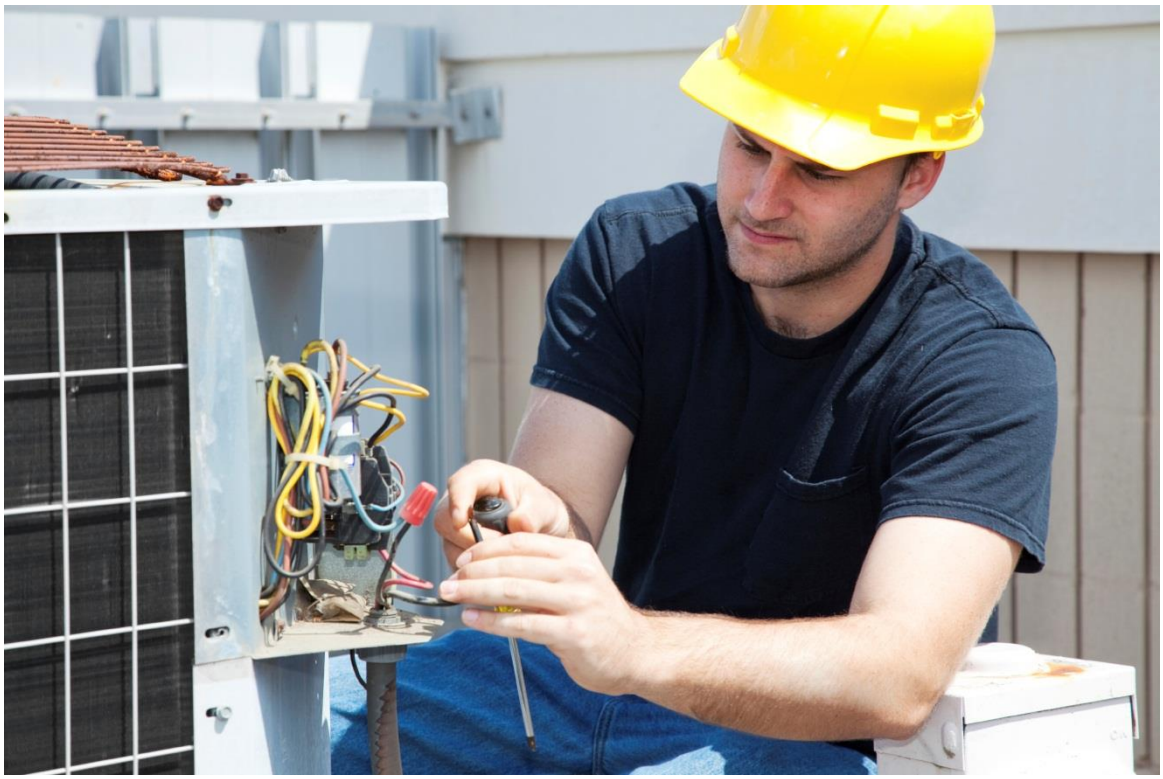
HVAC/R Technology AAS Degree

State Submission

Mark Wilson, President

January 2014



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HVAC/R TECHNOLOGY PROGRAM

EXECUTIVE SUMMARY

Western Dakota Technical Institute is seeking approval to expand its HVAC Diploma program to an Associate of Applied Science degree in Heating, Ventilation, Air Conditioning, and Refrigeration.

Labor market information for the state indicates that the demand for workers in the HVAC/R 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/R companies and public entities. Graduates also will—eventually—have the opportunity to start their own HVAC/R business.

Western Dakota Technical Institute will market this program as HVAC/R Technology. The degree is a two-year or four-semester curriculum.

IDENTIFICATION AND DESCRIPTION OF THE PROGRAM

The Heating, Ventilation, Air Conditioning, and Refrigeration 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/R 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/R 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/R theory, HVAC/R 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/R 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/R 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/R 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/R 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 already employs a full-time instructor. Additional courses will be taught by adjunct faculty. The projected budget is as follows:

Expenses	**Year One**	**Year Two**	**Year Three**
Instructors	$20,000.00	$22,000.00	$24,000.00
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 an AAS degree in HVAC/R 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/R-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**	**10th**	**25th**	**50th**	**75th**	**90th**
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/R Technology PROGRAM CURRICULUM

First Semester		Credits
CIS105	Microcomputer Software Applications	3
HVAC120	Electrical Applications for HVAC I	3
HVAC125	HVAC Installation I	3
HVAC130	HVAC Plan and Print Reading	2
HVAC126	HVAC Installation I Lab	4
PSYC103	Human Relations in the Workplace	3
	TOTAL CREDITS	**18**
Second Semester		**Credits**
ENGL201 ENGL101	Technical Writing or Composition	3
MATH 104	Technical Mathematics	3
HVAC135	Electrical Applications for HVAC II	3
HVAC140	Pipe Joining Methods	3
HVAC145	HVAC Installation II	4
HVAC146	HVAC Installation II Lab	3
	TOTAL CREDITS	**18**
	Third Semester	**Credits**
MATH100	Elementary Algebra	3
HVAC210	Refrigeration Technology I	3
HVAC215	Refrigeration Technology I Lab	4
HVAC225	Heat Pumps	3
	TOTAL CREDITS	**13**
	Fourth Semester	**Credits**
ECON202	Principles of Macroeconomics	3
HVAC230	Hydronic Heating Systems	3
HVAC240	Refrigeration Technology II	3
HVAC245	Refrigeration Technology II Lab	2
HVAC250	Advanced Systems	3
	TOTAL CREDITS	**14**

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

January 6th, 2014

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 the **HVAC AAS** 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. Our industry is an ever-growing business with constant technical changes and can flourish with well-trained employees educated in the last 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 The **HVAC AAS** 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,

Missy Sheesley-Johnson, President

WOLFF'S PLUMBING & HEATING, INC.

P.O. BOX 97 * SPEARFISH, S.D. 57783 * (605) 642-5755 * FAX (605) 642-5757
* RAPID CITY, S.D. 57701 * (605) 394-7782 * FAX (605) 642-5757 *

January 7, 2014

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

Dear Mr. Wilson,

Wolff's Plumbing and Heating, Inc. of Spearfish supports the HVAC AAS Degree Program to be offered by Western Dakota Tech.

Wolff's Plumbing and Heating, Inc. is one of the largest employers of mechanical professionals in the Black Hills area. We are constantly seeking qualified employees in plumbing and HVAC specialties. 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, and we offer an extensive apprenticeship program for students who want to advance their career once they've completed a formal HVAC AAS Degree Program curriculum. 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,

Scott Hartman
Vice-President

SOUTH DAKOTA ASSOCIATION
OF PLUMBING • HEATING • COOLING CONTRACTORS, INC.
OFFICE OF THE
EXECUTIVE VICE PRESIDENT
ken.phcc@midconetwork.com
(605) 271-7255 • 1-800-640-7422 • 1000 N. WEST AVE. #200 • SIOUX FALLS, SD 57104

January 7, 2014

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

Dear Mr. Wilson,

The South Dakota Association of Plumbing, Heating and Cooling Contractors, Inc. supports the HVAC AAS Degree Program to be offered by Western Dakota Tech.

Contractors are always seeking qualified employees in mechanical and HVAC specialties. 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, and we offer an extensive apprenticeship program for students who want to advance their career once they've completed a formal HVAC AAS Degree Program curriculum. 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
E. Vice President