Electrical Trades: Program Restructure

Submitted by:

Dr. Cathy Anderson

Western Dakota Technical Institute requests approval to expand the Electrical Trades program.

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ELECTRICAL TRADES RESTRUCTURED PROGRAM PROPOSAL

The Electrical Program at Western Dakota Technical Institute has been in existence for more than 30 years. Since the inception of this program, it has undergone many changes to keep current in the field, with employment demands and the evolving needs of students. The previous name of this program, Electrical and Electronics Technology, did not accurately reflect the removal of the electronics portion of the program which was predominantly due to a declining demand in the job market for trained electronics professionals. While the demand for trained professionals in the field of electronics declined, the demand for trained professionals in the field of electricians stabilized and increased.

IDENTIFICATION AND DESCRIPTION OF THE RESTRUCTURED PROGRAM

This program will offer an Associates of Applied Science in Electrical Trades. The Electrical Trades program will provide training to the workforce in the following areas: automatic control of industrial processes using programmable logic controllers (PLCs), industrial instrumentation, blueprint reading, DC and AC machinery, and power distribution. The program will also cover basic theory of electricity, household and industrial electrical maintenance, appropriate tool usage, proper inspection procedures, and troubleshooting methods. Students will develop the practical skills needed to work with electrical machinery, hand tools, electric and electronic machine control devices, and other electronic equipment. An emphasis will be placed upon the appropriate procedures to ensure a safe working environment. The course work emphasizes electrical construction and industrial work which includes theory and lab experience in troubleshooting, circuitry, industrial electronics, electrical machinery and electrical construction practices, including programmable logic controllers. Specific emphasis will be placed on learning and applying the National Electrical Code. This program will prepare the student to be an electrician in an industrial maintenance or construction environment.

Based upon information from the Occupational Outlook Handbook, graduates from this program will gain hands on experience on how to "install and maintain all of the electrical and power systems for our homes, businesses, and factories. They install and maintain the wiring and control equipment through which electricity flows. They also install and maintain electrical equipment and machines in factories and in a wide range of other businesses."

OBJECTIVE AND PURPOSE OF THE RESTRUCTURED PROGRAM

The primary objective of the Electrical Trade Program is to graduate students with the necessary skills to be employed in this field. Objectives for the restructured program include:

- Provide students with necessary knowledge to create a safe working environment by planning and practicing safe work procedures.
- Develop skills necessary to design an electrical project using the National Electrical Code.
- Exhibit knowledge of proper construction and troubleshooting techniques.

- Provide opportunities for students to collaborate with other trades on projects using written and verbal instructions.
- Train students to use the proper tools to diagnose and repair electrical circuits and equipment.
- Develop skills needed to interact effectively with co-workers and other tradespersons.
- Provide students with skills to market their knowledge and skills to potential employers.
- Equip students with work place etiquette and hygienic requirements consistent with the electrical trade industry
- Coach students on the value diversity.

METHODS OF OBTAINING THE OBJECTIVES OF THE PROGRAM

WDT employs instructors who reflect the new definition of the program. With assistance from an advisory committee, the instructors will finalize any necessary details regarding curriculum, and purchasing supplies and equipment. Details associated with a new program proposal are already in place. WDT demonstrates that it possesses the resources and staff necessary to:

- Assess the abilities of students for ~~good~~ program and course placement
- Provide instructional resources, textbooks, and experiential learning opportunities
- Provide cutting-edge technology to prepare students for high skill careers
- Provide access to courses, as appropriate, via online and other distance education methods.
- Labs or other instructional things that will help a student be successful
- Provide career and personal counseling to students
- Continual enlistment of Advisory Committee for information on industry needs and trends.
- Assist students with placement upon successful completion
- Stay abreast of current trends and industry needs in the program area
- Facilitate internships
- Provide opportunities to explore various careers associated with the electrical trades industry
- Provide classrooms and laboratories
- Provide a variety of general education courses
- Provide tutoring for students needing extra academic help

LABOR MARKET INFORMATION

Electrical/Electricians	2008			2018			% change	Employment change
	Employment	% of Ind	% of Occ.	Employment	% of Ind.	% of occ.		
Total Employment all workers	694.9	.46	100.00	777.9	.47	100.00	11.94	83.0
Total Wage and Salary Employment	630.7	.45	90.75	690.2	.45	89.85	10.87	68.6

*This information was retrieved from the South Dakota Department of Labor website: http://dlr.sd.gov/lmic/menu_wages_earnings.aspx

According to the advisory committee minutes from March 2009 it was agreed that the programs could be combined with possible options available for students to pursue, with green technologies being one track that students could select as well as Electrical Trades as it is now referred to. The opportunities for employment as indicated above, focus on the Western South Dakota geographical area but may expand beyond those physical boundaries to encompass and consider the multiple opportunities for electricians.

Since that time a large employer of the Electronics students specifically; SCI, closed which now made the demand for graduates from this track drop to none, as a result only four students are graduating from the program this year with none enrolling, therefore the decision was made to discontinue the program.

WAGE FACTOR

There are currently 310 people employed as electricians in the Rapid City area. Expanding this service area to include all of Western South Dakota adds an additional 140 people employed as electricians. According to the Labor Market Information System, the hourly mean wage of those employed is $20.66. The bottom wage is $14.66-$15.02 per hour while the top wage earners make approximately $25.42-$28.02. (Retrieved from South Dakota Department of Labor information)

POPULATION TO BE SERVED BY THE PROGRAM

The program is available to any applicant who has successfully completed the admission criteria set by Western Dakota Technical Institute. WDT does not discriminate in its educational programs on the basis of race, color, creed, religion, sex, disability, national origin, or ancestry. The program will draw its students from South Dakota and surrounding states. This program has targeted a diverse student population including traditional students and those non-traditional students looking to diversify their career; who, by economic necessity, personal reasons, and a desire to increase their skill level, enroll in this program.

PROJECTED THREE YEAR BUDGET

Employee Salaries and Budgets:

Year One	Year two	Year three
$ 156,210.00	**$ 162, 000.00**	**$ 170,000.00**

Equipment and supplies:

$ 45,000.00	**$ 47,000.00**	**$ 50,000.00**

Totals:

$ 161,210.00	**$ 208,000.00**	**$ 220,000.00**

PROGRAM COMPETENCIES AND ENTRY AND EXIT POINTS OF SUBOCCUPATIONS

Entry point: fall and spring semester
Exit Point: After completion of all coursework and attainment of Associates of Applied Science in Electrical Trades

STATEMENT OF NON-DUPLICATION

There are other similar programs in the State. However, each has demonstrated its own viability by continuing to increase enrollment numbers from year to year.

CURRICULUM DESIGN AND RESEARCH

Course Name	Course Number	Description	Credits
Microcomputer Software Applications I **Or**	CIS105	An introductory course on computers, Microcomputer Software Applications 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).	3
Microcomputer Software Applications II	CIS106	This course is an intermediate level course software application, which includes technical concepts, as well as, hands-on experience. The utility of the computer is demonstrated by advanced concepts in Windows, word processing, spreadsheet, database, and presentation software to the student. PREREQUISITE: SUGGESTED CIS105 OR STRONG BACKGROUND IN MICROSOFT OFFICE SUITE (A computer course is required of all students at WDTI; students may take CIS 105 or CIS 106).	3
CPR	CPR100	Students will be instructed in Cardiopulmonary Resuscitation (CPR) and Emergency Cardiac Care in accordance with the American Heart Association and First Aid. Also covered is what to do in the first five minutes. The information will enable the first responder to manage almost any emergency until professional help arrives.	1
Principles of Economics (MACRO) **OR**	ECN202	The course is designed to provide students with a better understanding of macroeconomic issues that affect their daily lives. Economics is about making choices, i.e., how we use our limited "means" to satisfy our unlimited wants. Macroeconomics considers how the economy as a whole makes those decisions, both domestically and on the global scene.	3
Intro to Sociology	SOC100	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
Career Communications	ENGL102	This course covers the communication skills required for success during the job hunt and on the job.	2
Technical Writing I	ENGL201	This course presents the basic principles and forms of written and oral communication in the Instruction leads students through planning tasks, identifying audiences, and gathering information. Major emphasis is on writing reports.	3
Technical Math I	Math104	This course includes real numbers and variable expressions, first-degree equations, polynomials,	3

		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: H S Math and a COMPASS Score in Pre-Algebra Domain of 40 or higher.	
Orientation	ORT010	The course is designed to increase the student's success in school by assisting the student in obtaining skills necessary to complete his/her education objectives. Topics include: study skills, communications skills, and problem solving skills.	1
Human Relations in the Workplace	PSYC103	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 personal and career lives. It will introduce students to the skills necessary to create and maintain positive relationships and interactions in the workplace.	3
TECHNICAL REQUIREMENTS			
Computer Hardware Installation and Troubleshooting	ELT217	This course will provide a basic understanding of how personal computers work and provide an opportunity for students to obtain the knowledge and skills necessary to service PC hardware and supported peripherals. Upon conclusion of this course, students will be able to: understand basic components of computer hardware systems, as well as upgrading and troubleshooting computers.	4
Electrical Fundamentals	IEL 132	This course introduces the fundamental concepts of basic electricity AC, DC and Solid State. It includes basic circuit analysis of series circuits, parallel circuits, series-parallel circuits and ohms law. A study of electrical quantities and measuring basic quantities using a VOM and the oscilloscope are included. This course covers the physical make up and characteristics of electrical components and how to analyze & troubleshoot circuits.	3
Electrical Fundamentals Lab	IEL133	This course addresses the lab study of AC, DC, Solid State, Series, Parallel, Series-parallel, inductance and capacitance. Measuring basic quantities using a VOM and the oscilloscope are included. How to analyze & troubleshoot circuits. Voltages and currents are measured to demonstrate circuit characteristics.	7
Electrical Heating and Appliances	IEL213	This course is intended to provide the student with an understanding of electrical heat and electrical heating control circuits. Installing, maintaining and troubleshooting electrical heating systems are an	2

		important part of the industrial electrician's career. This course will also introduce the student to air conditioning and heat pump operation.	
Wiring Lab I	IEL218	The purpose of this course is to provide the student with the basic skills and technical knowledge required to enter the electrical construction field as an inside wire person. The course activities provide varied applications of practical job and shop practices and experience in the use of an electrician's tools and equipment. Actual on the job training is obtained through the rough in wiring of the WDTI project house. PREREQUISITES: IEL 128 INTRODUCTION TO ELECTRICAL WIRING and IEL 122 ELECTRICAL CODE STUDY I (OR CONCURRENTLY).	3
Electrical Motor Control	IEL211	This course is intended to familiarize the student with motor control theory from basic concepts to much more complicated circuits. This course should be taken concurrently with motor control lab. PREREQUISITES: IEL 128 INTRODUCTION TO ELECTRICAL WIRING and IEL122 ELECTRICAL CODE STUDY I.	3
Motor Control Lab	IEL216	This course utilizes a hands-on approach to learning motor-control circuit wiring. The student will complete the control wiring of sample circuits using the developed trainers in the lab. This hands-on experience greatly helps the student in retaining the information that is presented in the Electrical Motor Control course. PREREQUISITES: IEL 128 INTRODUCTION TO ELECTRICAL WIRING, IEL 122 ELECTRICAL CODE STUDY I and IEL 211ELECTRICAL MOTOR CONTROL (OR CONCURRENTLY).	2
National Electrical Code II	IEL214	This course deals with commercial and industrial wiring standards with heavy emphasis on the National Electrical Code. Electrical services are studied in more depth; grounding and bonding are emphasized, and wiring methods for several types of specific locations are studied. PREREQUISITES: IEL 201 ELECTRICAL CODE STUDY I.	2
Programmable Logic Controllers	IEL221	`This course introduces programmable logic controllers and the concepts and structure of programmable controllers and provides beginning programming skills. The student will have the basic knowledge to be able to do limited maintenance, programming and installation of programmable controller systems in the industrial environment. The student will also have the background for more advanced training in programmable control. PREREQUISITE: IEL 211 ELECTRICAL MOTOR CONTROL and IEL 216 MOTOR CONTROL LAB.	2
Programmable Logic Controllers	IEL222	This course will give the student hands-on experience in programming Programmable Controllers. The theory learned in previous course	3

		work will be put into practice in a laboratory environment that includes simulated industrial applications. Programmable control is an area of ever-increasing industrial importance today. PREREQUISITES: IEL 211 ELECTRICAL MOTOR CONTROL, IEL 216 MOTOR CONTROL LAB and IEL 221 PROGRAMMABLE LOGIC CONTROLLERS (OR CONCURRENTLY).	
Wiring Lab II	IEL220	This course is a study of the National Electrical Code in relation to commercial and industrial electrical installations. Actual electrical installations, compiling pertinent facts for bidding purposes and on the job training through the wiring of the WDTI project house are included in this course. PREREQUISITE: IEL 128 INTRODUCTION TO ELECTRICAL WIRING and IEL 214 CODE STUDY II (OR CONCURRENTLY).	3
Power Distribution	IEL224	Transformers are considered the single most important type of equipment in the process of distribution of electrical power. Transformer study is therefore a large portion of this course. Included in this course are transformer theory, code and actual transformer connections. PREREQUISITES: IEL 128 INTRODUCTION TO ELECTRICAL WIRING and IEL 122 ELECTRICAL CODE STUDY I.	2
TECHNICAL ELECTIVES			
Introduction to Alternative Power Systems	AET240	This course is an introduction to alternative and standby power generation systems. Types of generation and transfer switching techniques will be covered. PREREQUISITES: IEL110 DC Theory and Lab, IEL115 AC Theory and Lab, ELT206 Solid State 1 Theory and Lab.	3
Electrical Code Study for Alternative Energy	AET242	This is a code course designed to familiarize students with the National Electrical Code. It deals with commercial and industrial wiring standards with heavy emphasis on the articles that deal with Solar, Wind and Communications Systems. During this course, the student will become accustomed to using the national Electrical Code and the articles that apply to Alternative Energy Systems.	1
Electronic Controls	AET245	An introduction to electronic control systems that include electromechanical, control processor and feedback systems. The course will cover the basic concepts of control systems including sensors, mechanical concepts, switching devices, actuators and digital controls. PREREQUISITES: IEL110 DC Theory and Lab, IEL115 AC Theory and Lab, ELT206 Solid State 1 Theory and Lab	2
Electronic Controls Lab	AET246	A laboratory course to accompany the 'Introduction to Electronic Controls' course. Laboratory exercises will follow the lecture course and will provide experience in working with the	2

		components commonly found in electronic control systems. PREREQUISITES: IEL110 DC Theory and Lab, IEL115 AC Theory and Lab and ELT206 Solid State1 Theory and Lab.	
Wind & Solar Power Systems Theory	AET248	An introduction to Wind and Solar Power Generation will cover installation, troubleshooting and connection to existing power systems. PREREQUISITES: IEL110 DC Theory and Lab, IEL115 AC Theory and Lab, ELT206 Solid State 1 Theory and Lab.	3
Wind & Solar Power Systems Lab	AET249	An introduction to Wind and Solar Power Generation will cover installation, troubleshooting and connection to existing power systems. PREREQUISITES: IEL110 DC Theory and Lab, IEL115 AC Theory and Lab, ELT206 Solid State 1 Theory and Lab.	3
Electrician Internship/Co-op	IEL299	Internship	6

Semester Breakdown

First Semester		CR
IEL 132	Electrical Fundamentals	3
IEL 133	Electrical Fundamentals Lab	7
CIS 105	Microcompute Software App I *or*	3
CIS 106	Microcomputers Software App II	
CPR 100	CPR/First Responder	1
MATH 104	Technical Mathematics	3
ORT010	Orientation	1
	Total Credit Hours	**18**

Second Semester		CR
ELT 217	Computer Hardware Installation/Trouble shooting	4
IEL 123	Industrial Data Communication	2
IEL 128	Introduction to Elect Wiring	2
IEL 129	Intro to Electrical Wiring Lab	1
IEL 135	Basic Electrical Materials and Devices	1
IEL 140	Welding & Fabrication for Lt Commercial Application	2
IEL 226	Electrical Motor Fundamentals & Maint.	2
IEL 223	Electrical Motor Fundamentals & Main Lab	1
ENGL 201	Technical Writing	3
	Total Credit Hours	**18**

Third Semester		CR
IEL 122	Electrical Code Study I	3
IEL 210	Bluepring Reading Elect Plan/Est	5
IEL 211	Electrical Motor Control	3
IEL 216	Motor Control Lab	2
IEL 218	Wiring Lab I	3
ECON 202	Prin of Macroeconomics- *or*	3
SOC 100	Intro to Soc	
IEL 299	Optional Electrician Internship/CO-OP	**(6)**
	Total Credit Hours	**19/ (25)**

Fourth Semester		CR
IEL 213	Electrical Heating & Appliances	2
IEL 214	National Electrical Code II	2
IEL 220	Wiring Lab II	3
IEL 221	Programmable Logic Controllers-PLC's	2
IEL 222	PLC Labs	3
IEL 224	Power Distribution	2
ENGL 102	Career Communications	2
PSYC 103	Human Relations in the Workplace	3
	Total Credit Hours	**19**

Suggested CIP Code:

WDT is recommending a new CIP code to better reflect the careers these students are preparing for: **Electricians CIP code: 46.0302**

APPENDIX A-LETTERS OF SUPPORT

Dear Mark Wilson,

When approached to write a letter of support for the name change of the Electrical and Electronics Technology program by Dr. Anderson I readily agreed. I have been involved in the electrical industry for 17 years and in that role I have observed the need for a skilled workforce in the electrical field.

I have reviewed the proposal for the name change of the program and feel that this will better define the educational programming provided by Western Dakota Technical Institute and the needs of the community. As an instructor for the Independent Electrical Contractors Association I value the benefits of continuous education for employees in the electrical field. In my role as an electrician in the Rapid City area and South Dakota I have had to apply and make changes in my approach to the job due to coding changes and changes in the National Electrical Code. Staying current with these does require ongoing education and a foundation of basic knowledge and skills upon which to build and which Western Dakota provides to students.

I am not an advisory committee member for the electrical program at WDTI, however Dr. Anderson did share the proposal for the name change for this program. I have a better understanding of the history of the program and the justification for the name change and support this proposal by WDTI.

Thanks,

Mark A. Preble

March 15, 2011

Mark Wilson
S.D. Department of Education
800 Governors Drive
Pierre, SD 57501

Dear Mark Wilson,

The requested name change in the electrical program, from Electrical and Electronics Technology to Electrical Trades, is not only necessary due to changes in the program but will better reflect the needs of today's industry.

As an advisory board committee member for the electrical program, I am a supporter of the mission of Western Dakota Technical Institute (WDTI). I frequently observe the work of WDTI graduates through the work I do in the electrical trades field and value their contribution and work in the community.

As the only technical institute in Western South Dakota and the only one of four in South Dakota; WDTI is recognized as a leader in providing technology education to the citizens of the state. I value, as do other advisory board members, a close working relationship with the institute and emphasize their close working relationship with industry.

WDTI's request to rename the electrical program to Electrical Trades is needed in order to support and ensure successful educational goal completion for South Dakota's students seeking a career in the electrical trades field.

Thanks,

Jeff Larus
Building Inspector III
City of Rapid City

Don Martinez
Energy Services Engineer
Don.Martinez@blackhillscorp.com

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Rapid City, SD 57709
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March 16, 2011

Mark Wilson
S.D. Department of Education
800 Governors Drive
Pierre, SD 57501

Dear Mark Wilson,

I support Western Dakota Technical Institute's application to change the name of the Electrical and Electronics Technology Program to Electrical Trades. This program plays a key role in Western South Dakota in providing students with the skills and abilities they need to be successful in the electronic trades industry.

Maintaining a highly skilled workforce is essential to meeting the demands of economic development in Western South Dakota and the region. WDTI plays an essential role in meeting the demand of providing a skilled and trained workforce through academic programming.

WDTI involves the community in establishing the academic programming through industry advisory committees to determine industry needs. Along with two scheduled advisory board meetings per year, WDTI instructors communicate with the committee members throughout the year.

WDTI is making the appropriate changes to this program in response to the changing demands of industry. Therefore, the request to rename the electrical program from Electrical and Electronics Technology to Electrical Trades is essential in keeping up with industry trends. WDTI is a leader in Western South Dakota in providing up to date education in response to the changing economic environment.

Sincerely,

Don Martinez