

**Proposal to Offer an Associate of Applied Science Degree in Electrical Technology
Montana State University-Northern**

Program Description

The proposed Associate of Applied Science Degree in Electrical Technology is designed to satisfy part of the training and instructional requirements of a traditional apprenticeship required in the state of Montana to become a licensed electrician. Apprentice electricians in Montana are currently required to complete a four-year training program and over 200 hours of "traditional coursework" each year before they can sit for the licensure examination. The training occurs on- the-job and the coursework is provided either by the North Dakota State College of Science in Wahpeton or state-approved Joint Apprenticeship Training Centers or Independent Electrical Training Centers.

The proposed AAS degree in Electrical Technology at Montana State University-Northern will provide some of the training and some of the coursework mandated by apprenticeship standards. Because the proposed electrical degree was developed with the assistance of an advisory board of master electricians from around the state of Montana and the Montana Department of Labor, it is anticipated that students who complete the AAS degree will satisfy two years of the four-year apprenticeship period required of licensed journeymen electricians.

Need for the Program

The Montana Independent Electrical Contractors Association proposed the idea of an electrical program to MSU-Northern and asked that we consider initiating an Associate of Applied Science degree in electrical technology similar to our plumbing degree. The Dean of the MSU-Northern College of Technical Sciences met four times with the MIECA and twice with delegates from various unions across the state of Montana. He also met numerous times with Mark Maki, Director of the Apprenticeship Program, Montana Department of Labor, to coordinate the proposal. MSU-Northern also formed an Electrical Advisory Board (see Appendix 1) to do a feasibility study on the proposed electrical program.

The United States Department of Labor is predicting a significant increase in the number of electrician jobs through 2010. The Department estimates that the United States economy will need 37,000 new electricians every year until 2010 to keep up with demand for that important skill. The Department also reports that electricians are among the highest paid construction occupations, with a median hourly wage of \$27.00 in 2005. Apprentice electricians typically start at about 50 percent of the wage rate paid to experienced electricians; that wage increases periodically as the apprentice worker acquires more skills.

The U.S. Department of Labor's *Occupational Outlook Handbook* states...*the electrical industry will employ 25 to 36 percent more workers through 2010. Because of the increased sophistication of the systems these technicians work on and the equipment they use, the prospects will be considerably better for those with technical school or formal training. Electricians can expect to earn over \$47,000 a year, while a seasoned technician, contractor, or engineer can earn up to \$100,000 a year.*

Salaries in Montana mirror the national picture. A licensed journeyman electrician, in Montana's urban counties, averages about \$25.50/hour for his/her work. That same journeyman electrician earns slightly less in rural areas, but the hourly wage still averages around \$25/hour.

The salary for Montana's apprentice electricians is similar to the national average. Apprentices can expect to earn about 50% of a licensed journeyman's wage in the first years of their training. As the worker becomes more skilled, the salary typically increases during the apprenticeship period.

The need for electricians, and the employment opportunities for apprentice electricians, is less specific in Montana. However, the following information gives some idea about the employment opportunities:

- In a typical year, over 350 apprentice electricians are registered with the State of Montana.
- Since the statutes and regulations require a four-year apprenticeship before candidates can sit for the licensure examination, approximately 50 of those apprentices would be eligible to become electricians in Montana each year.

- According to Roy Symons, Apprenticeship and Training Specialist with the Montana Apprenticeship & Training Program of the Department of Labor and Industry, the average attrition rate for all apprenticeship programs in Montana is between 12 – 15%. While that percentage is not specific to the electrical trade, it can be used as a guide to suggest that approximately six (6) apprentice electricians, in the original cohort of 50, fail to complete their training.
- The licensure test for a journeyman electrician is quite rigorous. According to the members of the Electrical Advisory Board, who met on MSU-Northern's campus in April of 2005, the "pass rate" is approximately 80 percent. That means that another 9 – 10 apprentice electricians, who finally sit for the examination, fail to satisfy this last hurdle for licensure.
- At the present time in Montana, the electrical trade has no available and convenient pool of apprentice electricians from which to draw. Licensed electricians ordinarily have to find their own apprentice employees and according to the advisory board members that can be a "hit or miss" proposition.
- The closest educational program in electrical is located at the North Dakota State College of Science in Wahpeton, North Dakota. Some Montana students attend that program, and a few of them can be enticed to return to the State of Montana as apprentice electricians states the Electrical Advisory Board members. Once the students complete the North Dakota program, many do not return to Montana.
- The electrician profession in Montana is aging. The average age of licensed electrician in Montana is in the mid to late-40s, according to MSU-Northern's Electrical Advisory Board members. There is significant need to replace those skilled craftsmen.

According to the Advisory Board, students from the proposed electrical program at MSU-Northern should be heavily recruited. As future apprentices, they have already demonstrated their interest and commitment to a career in the electrical trade by making an investment in that career choice by attending the program at MSU-Northern. Both of those facts will make the graduates from MSU-Northern's electrical program strong candidates for any apprenticeship openings in the State (See Appendix 2).

Role and Scope of the Institution

The proposed Associate of Applied Science degree in Electrical Technology fits the mission of Montana State University-Northern. The institution has a long history of providing technical education to the citizens of Montana. In fact, that technical niche is the institution's unique role among the four-year campuses in the higher education community in the State of Montana. The new program in electrical technology is a continuation of MSU-Northern's special commitment to education in the professional trades, and its history of creating high-quality, post-secondary training for those occupations.

MSU-Northern also intends to develop additional classes in electrical to satisfy the requirement of at least 200 hours of traditional coursework for individuals who are participating in the four-year electrician apprenticeship.

Effect on the Administrative Structure

The AAS in Electrical Technology will join the programs in the College of Technical Sciences and remain under the direction of the Dean, requiring no revision of the current administrative structure.

The Arts and Sciences Department will provide the foundation courses needed for the degree. The College of Technical Sciences will also work closely with Extended University for assistance with distance delivery.

Accreditation

The program will be accredited through the Northwest Commission on Colleges and Universities. The program will also be closely monitored by the Montana Department of Labor.

Assessment

This program will have an active advisory board that will consist of at least one member from each of the following agencies: the Independent Contractors, the electrical union, the state board of electricians and the Montana Department of Labor. The board will meet at least twice a year to evaluate the success of the program and advise in program needs. Licensure pass rates and feedback from employers who assess student readiness to enter the apprenticeship programs will also be used to determine the effectiveness of the program.

Curriculum

Course Prefix	Course #	Course Title	Foundation Core Credits	Degree Credits
FRESHMAN YEAR				
CIS	110	Intro to Computers	3	
ELEC	101	Electrical Fundamentals I		5
ELEC	103	Electrical Code Study/Codeology		3
HPE	234	First Aid & CPR		2
ELEC	137	Electrical Drafting		2
MAAS	106	Elementary Technical Math	3	
ELEC	106	Electrical Formulas & Computations		3
ELEC	111	Electric Meters & Motors		3
ELEC	102	Electrical Fundamentals II		5
ELEC	133	Basic Wiring		3
ELEC	139	Electric Code Study-Residential		3
SOPHOMORE YEAR				
ELEC	201	Alternating Current Theory		5
ELEC	205	Electrical Design & Lighting		3
ELEC	211	AC Measurements		3
ELEC	233	Commercial Wiring Lab		3
ENGL	112	Written Communication II	3	
ELEC	204	Electrical Planning & Estimating		3
ELEC	236	Conduit, Raceways & Code Calcs Lab		3
ELEC	239	Grounding/Bonding Fundamentals		3
ELEC	241	Electric Motor Controls		3
IT	111	Industrial Safety/Waste Management		2
ELEC	2XX	Medium & High Voltage		1
SPCH	141	Fundamentals of Speech	3	

70 Credits

Montana State University-Northern worked closely with master electricians in developing this degree to ensure that the curriculum met the expectations of Montana law. Mark Maki from the Montana Apprenticeship & Training Program has assured the institution that "two years of the apprenticeship will

be satisfied." MSU-Northern will obviously work to ensure that maximum two-year credit is awarded in the proposed program.

Basis for the Curriculum

The electrical trade is carefully regulated by the State of Montana and licensure requirements for the electrical trade are carefully defined by the State. As a result, the instruction and the outcomes of the curriculum will be focused on the competencies expected as part of the apprenticeship training and tested at the time of licensure. In addition, today's job market also requires that workers are competent in communication, critical thinking and interpersonal relations. This associate degree program requires all the above within the degree.

The proposed electrical degree at Montana State University-Northern satisfies the undergraduate degree requirements for associate degrees, as set out in Montana Board of Regents' policy 301.12.2.b. The degree also contains the following existing courses: CIS 110, Introduction to Computers; ENGL 112, Written Communication II; MAAS 106, Elementary Technical Mathematics; SPCH 141, Fundamentals of Speech; HPE 234, First Aid and IT 111, Industrial Safety/Waste Management. Eighteen new electrical courses included in the degree include such topics as electrical fundamentals, electrical codes, AC measurements, electrical design and wiring and electric motor controls. The design of the program was carefully reviewed by master electricians throughout the State of Montana, the Montana Department of Labor, and the faculty at Montana State University – Northern.

Apprenticeship programs are also carefully regulated by the United States Department of Labor and the Montana Department of Labor and Industry. The U.S. Department of Labor, for instance, requires that all certified apprenticeship programs in the United States must include a minimum of 144 hours of traditional coursework each year in the particular trade area. States are permitted to mandate more than the minimum, and Montana has acted on that opportunity to require at least 200 hours of traditional coursework each year in all of its apprenticeship programs.

Electrical coursework is not readily available in the State of Montana. Some electrician apprentices satisfy this requirement by enrolling in programs established by electrician unions and independent electrical contractors throughout Montana. At least half of the apprentices do not have access to these instructional programs so they enroll in correspondence courses from the North Dakota State College of Science. These classes are traditionally paid for by the licensed electrician employing the apprentice. Over the course of a four-year apprenticeship, electricians-in-training in Montana will usually complete 800 hours of classes from the North Dakota school.

Faculty and Personnel

The program will require one new full-time faculty the first year and an additional .5 faculty the second year. The program will also need .5 clerical support personnel to assist with the correspondence component of the apprenticeship program.

Facilities

Montana State University-Northern has both a computer engineering and an electronics technology program that will offer some overlap to this program. The electronics building is a well-equipped facility and will be used to house this program. At the present time the proposed laboratory space for this program is underutilized.

Relationship to Other Campus Programs

At the present time no other campus in the Montana University system offers a program in electrical. However, Flathead Valley Community College has approached us about the possibility of setting up an articulation agreement from a one-year certificate in electrical from their campus into our proposed program.

Budget Analysis

Proposed Program: AAS, Electrical Technology					
Campus: Montana State University - Northern					
		Year 1	Year 2	Year 3	
Estimated Enrollment					
FTE Enrollment		10	20	25	
Estimated Incremental Revenue					
Use of Current General Operating Funds*		\$9,000	\$9,000	\$9,000	
State Funds (HB2 – new program dev.)		\$79,800	\$22,000	0	
State Funding for Enrollment Growth				\$18,900	
Tuition Revenue					
A. Gross Incremental Tuition Revenue		\$33,340	\$71,720	\$96,374	
B. Reductions to Incremental Tuition	(fee waivers @19%)	\$3,668	\$7,889	\$10,601	
C. Net Applied Tuition Revenue (A-B)	→	\$29,672	\$63,831	\$85,773	
Program Fees		0	0	0	
External Funds		0	0	0	
Other Funds (projected equipment/supplies donated by industry)		\$25,000	\$15,000	\$10,000	
TOTAL Estimated Revenue (C + External)		\$134,472	\$109,831	\$123,673	
Estimated Incremental Expenditures					
		FTE	Cost	FTE	Cost
Personal Services (1.5 FTE faculty; .5 staff)		1.0 faculty .5 staff	\$71,200	1.5 faculty .5 staff	\$80,661
Operating Expenses (Library acquisitions, supplies & phone/data costs; computer/printer)		\$5,600		\$2,488	\$3,184
Equipment		0		0	0
Start-up Expenditures (marketing)		\$3,000			
TOTAL Estimated Expenditures		\$79,800	\$80,800	\$83,845	
Estimated Revenues Over/Under (+ -) Expenditures		\$54,673 +	\$29,031 +	\$39,828 +	

* using current facility space (approximately 1500 square feet)