

1.0 Identification and Description

Program Title:	Wind Turbine Technology
Length of Program:	One Year Diploma; Two-Year AAS Degree
Number of Students:	18
Projected Start Date:	Fall 2009

Mitchell Technical Institute proposes to be the first school in South Dakota to offer a program in Wind Turbine Technology. It would be MTI's intent to educate a skilled workforce to support wind projects. As the wind energy program expands in South Dakota, graduates and partners of this program would become an integral part of overall economic development. Currently, there are fewer than 30 programs nationwide offering a certificate or degree in wind-related technology. The MTI program would combine portions of existing programs along with new additions to the curriculum to offer a two-year AAS degree with a one-year diploma exit point for students interested in this growing industry.

A Wind Turbine Technology program would include basic coursework in the areas of construction of wind towers and operation and maintenance of wind turbines. Students in the second year of the program would receive additional training in the areas of low and medium voltage electricity, electrical, pneumatic and hydraulic systems, SCADA (computerized control and monitoring of systems and data acquisition), repair, and troubleshooting. General education courses will include technical writing, technical math, behavioral and social sciences, and computers.

Graduates of the program would qualify for entry-level positions with the skills and education to become wind turbine operators and potentially assume leadership positions in supervision and management.

2.0 Objective and Purpose

The program will be dedicated to offering students the experience and overall training to become successful Wind Turbine Technicians. Mitchell Technical Institute is ideally suited to offer this program because of existing programs in Electrical Construction & Maintenance, Power Line Construction & Maintenance and SCADA Engineering Technology. These programs serve as a foundation for the multi-disciplinary industry of wind power.

The program will provide attention to professionalism, communication and technical skills. At the conclusion of the program, the students will be prepared:

- To understand the wind energy business, wind turbine technology, SCADA, and other related skills

- To perform quality controls on the equipment and maintain safety for their co-workers and themselves while carrying out duties
- To be able to perform the physical expectations of the job, including climbing and maintaining awareness of safety while working high above the ground
- To use the necessary tools and computer programs
- To evaluate malfunctioning equipment, troubleshoot the problem, and perform the necessary repair
- To give instructions to co-workers, subordinates and users
- To use interpersonal skills to professionally interact with others
- To use oral and written communication skills
- To function as an active member of an organization
- To broaden their knowledge bases through study in general education
- To foster independent thinking and lifelong learning skills
- To graduate from a program of quality with program goals, learning outcomes, and standards for course completion, graduation, and job placement.

3.0 Methods of Attaining the Objective of the Program

Pending approval, MTI will develop marketing materials and recruit students. Current instructors from various MTI departments including Power Line Construction & Maintenance, Electrical Construction & Maintenance, SCADA Engineering Technology, Computer Systems Technology and others along with assistance from an advisory committee will prepare course syllabi, purchase equipment and supplies, arrange classrooms, develop schedules, secure resource materials, arrange internship sites and interview staff to hire.

MTI provides assurance that it possesses the resources and staff necessary to:

- Develop marketing materials and recruit students
- Recruit and supervise qualified staff
- Assess the abilities of students for good program and course placement
- Provide tutoring for students needing extra academic help
- Provide access to library materials and computer labs
- Develop and administer budgets
- Make available textbooks and other instructional resources

- Provide career and personal counseling to students
- Evaluate programs and staff
- Assist students in finding jobs

- Secure input from industry through advisory committees
- Maintain membership in professional organizations and provide time and fiscal resources for professional development
- Provide financial aid and scholarships
- Provide for internships
- Provide a typical two-year technical institute climate
- Assist students with housing and provide daytime food service
- Provide services to disabled and nontraditional students
- Provide classrooms and laboratories
- Provide a variety of general education courses.

4.0 Labor Market Demands

Wind energy is a burgeoning industry. In 2007, according to the American Wind Energy Association (AWEA), 3,200 new wind turbines were installed across the nation as power companies responded to the push for more green energy. That translates to a 45% growth in the nation's total wind power generating capacity in a single calendar year. AWEA predicts 2008 will equal 2007 in new wind capacity installed. (www.awea.org)

In South Dakota, the MinnDakota Wind Farm, operated by PPM Energy, was completed last year, more than doubling the state's wind energy output. Other projects are in various stages of development including the ACCIONA Energy Tatanka Wind Farm, to be located in McPherson County, the Buffalo Ridge Wind Farm to be located in White, and a Wessington Springs regional project.

As any South Dakota resident could guess, the potential for the state to produce energy from wind is among the best in the nation. South Dakota ranks fourth in the U.S. (behind only North Dakota, Texas, and Kansas) in wind energy potential, making South Dakota's outlook for continued development of wind energy extremely promising. (www.awea.org)

New turbines mean new jobs for skilled South Dakotans. A general rule is that a two-person operation and maintenance team is needed for every 10 turbines. That means that trained wind turbine technicians are in big demand – in South Dakota and throughout the Midwest.

4.1 Student Needs

Mitchell Technical Institute will provide students with an opportunity to be trained in a rigorous, comprehensive program that will prepare them for success in a career in the wind industry. As with any program, MTI is prepared to offer a traditional campus environment and experience for students. Services like financial aid, a campus library, wireless computer network, computer labs, classrooms, and support services are provided.

4.2 Industry Support

See Appendix A for Letters of Support and supplemental information.

5.0 Population Served

The program is available to any applicant that has successfully completed the admission requirements set by Mitchell Technical Institute. MTI 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 that same geographical area.

This program will not only be targeted at traditional-age college students, but will also be appealing to career changers and older workers looking to change or enhance skills. It may be of particular interest to students from rural areas who wish to stay in smaller communities after graduation.

6.0 Proposed Budget

Proposed Three-Year Budget			
	2009-2010	2010-2011	2011-2012
Salary/Benefits	\$60,000	\$120,000	\$125,000
Equipment	\$200,000	\$50,000	\$500,000*
Supplies	\$3,500	\$3,500	\$3,500
Travel	\$1,000	\$2,000	\$2,000
TOTAL	\$264,500	\$175,500	\$630,500
	*Preliminary plans call for finding a matching grant for purpose of installing a full-sized wind turbine on the MTI campus.		

7.0 Program Competencies and Entry/Exit Points of Sub-occupations

Entry point will be Fall 2009.

The curriculum will be competency based and will be reviewed and approved by the Advisory Committee.

Exit points will be at the completion of coursework. Graduates will receive a one-year technical diploma in Wind Turbine Technology. Completion of the second year of the program will lead to an Associate of Applied Science degree in Wind Turbine Technology. Graduates must maintain an overall GPA of 2.0 to graduate.

8.0 Statement of Nonduplication

At the present time, we are not aware of a similar degree offered anywhere in South Dakota.

9.0 Proposed Curriculum

First Semester (Fall)

WTT 101	Introduction to Wind Energy	3
WTT 112	Wind Turbine Site Construction & Location	1
PL 111	Fundamentals of DC/AC	4
ECM 202	Motor Theory & Maintenance	2
PL 171	Utility Safety	2
CIS 105	Computer Software Applications	3
		15

Second Semester (Spring)

WTT 115	Wind Turbine Materials	3
WTT 120	Turbine Troubleshooting & Repair	4
WTT 121	Turbine Lab	3
WTT 125	Basic Fluid Power (Hydraulics)	3
WTT 172	First Aid/CPR	0.5
ENGL 201	Technical Writing	3
MATH 104	Technical Math	3
		19.5

Third Semester (Summer)

WTT 185	Internship	6
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Fourth Semester (Fall)

WTT 122	Wind Turbine Siting II	4
WTT 168	Wind Power Delivery Systems I	3
EC 137	Digital	2
SD 120	Intro to Industrial Motor Controls	3
PSYC 101	General Psychology	3
WTT 102	Career Seminar	1
		16

Fifth Semester (Spring)

WTT 170	Wind Business	3
WTT 178	Wind Power Delivery Systems II	3
SD 225	Intro to SCADA Software	2
ECM 259	Programmable Logic Controllers	3
SD 230	Introduction to Visual Basic	3
SOC 110	Industrial Relations	3

9.1 Proposed Course Descriptions

WTT 101	Introduction to Wind Energy	3 credits
This course is designed to familiarize the student with the evolution of wind technology, wind energy anatomy, wind farm design, and characteristics of energy sources. This course includes tower rescue training and climbing.		
WTT 102	Career Seminar	1 credit
Promotion of professional growth opportunities. Students will explore tools and concepts necessary during the job seeking process and examine professional development as a new employee.		
WTT 112	Wind Turbine Site Construction & Location	1 credit
Use of cranes, rigging, tower assembly, commissioning as well as other processes that involve wind turbine power production facilities.		
WTT 115	Wind Turbine Materials	3 credits
Identification and analysis of the components and systems of a wind turbine.		
WTT 120	Turbine Troubleshooting & Repair	4 credits
Practice of installation, operation, maintenance, troubleshooting and repair of wind turbine electro-mechanical systems.		
WTT 121	Turbine Lab	3 credits
Practical exercises involving installation, wiring, and troubleshooting of electrical devices and equipment used in wind turbine systems.		
WTT 122	Wind Turbine Siting II	4 credits
A continuation of WTT 112. More emphasis will be placed on lab projects and field trips.		
WTT 125	Basic Fluid Power (Hydraulics)	3 credits
Basic fluid power course covering vacuum systems, pneumatic and hydraulic systems, fluid power symbols, operating theory, components, and basic electrical and manual controls.		
WTT 168	Wind Power Delivery Systems I	3 credits
In-depth study of the components of the input and output electrical power delivery systems for wind generation.		
WTT 170	Wind Business	3 credits
Topics in business as they apply specifically to the wind energy industry.		

WTT 172	First Aid/CPR	0.5 credit
Practice and certification in first aid and CPR.		
WTT 178	Wind Power Delivery Systems II	3 credits
A continuation of WTT 168. Integration with SCADA systems is highlighted.		
WTT 185	Internship	6 credits
Work in a position related to the wind industry.		
EC 137	Digital	2 credits
Introduction to binary notation and numbering systems including octal and hexadecimal. Emphasis is also placed on logic gates, truth tables, flip flops, counters, and basic computer architecture.		
ECM 202	Motor Theory & Maintenance	2 credits
A practical hands-on course using ammeters, voltmeters, wattmeters, and multimeters in testing and troubleshooting electric motors, components, and wiring systems. A study of single and three-phase AC motors, their construction features and operating characteristics. This lecture/lab class emphasizes electric motor terminology, identification of motor types, enclosures, mounts, motor selection, connections, maintenance, testing and troubleshooting.		
ECM 259	Programmable Logic Controllers	3 credits
Programmable logic control systems for the control of electrical components and equipment. Projects using solid state devices in commercial and industrial applications are completed.		
PL 111	Fundamentals of DC/AC	4 credits
Basic electricity as it applies to high voltage lines. The student learns to apply Ohm's Law for DC circuits. The student learns basic generation and the effects of inductance and capacitance in the AC circuit.		
PL 171	Utility Safety	2 credits
OSHA, APPA, and NESC rules, procedures, and codes applied to the design and construction of overhead and underground lines.		
SD 120	Intro to Industrial Motor Controls	3 credits
Mechanical and electromagnetic control systems for both AC and DC systems will be studied. Ladder logic diagrams, starting and relay equipment used in control systems will be introduced.		
SD 225	Intro to SCADA Software	2 credits
SCADA software featuring the CITECT graphic software will be studied. Proper interfacing to PCs, RTUs, and PLCs will be covered to allow the proper operation of control circuits and for the collection of data in the system.		
SD 230	Introduction to Visual Basic	3 credits

This course is designed to provide the programmer with the tools needed to create Visual Basic applications that conform to well-adopted Windows standards.

10.0 Wage Factor

Wind technicians will make a starting annual salary of between \$35,000 and \$40,000, according to industry representatives. (AP, July 31, 2008)

Because the career is in an emerging industry, official job and wage statistics are not yet available from the usual government labor resources. Skills and training, and therefore wages, would compare favorably with other similar careers in electrical maintenance. The following table represents the job and salary data for electrical and electronics repairers as projected by America's Career InfoNet Online (www.acinet.org). Wind technicians would earn very comparable wages.

Location	Pay		2006			
	Period	10%	25%	Median	75%	90%
United States	Hourly	\$19.42	\$23.62	\$27.60	\$32.07	\$35.49
	Yearly	\$40,400	\$49,100	\$57,400	\$66,700	\$73,800
South Dakota	Hourly	\$19.96	\$21.94	\$24.88	\$27.54	\$29.75
	Yearly	\$41,500	\$45,600	\$51,800	\$57,300	\$61,900

Appendix A