



Wind Energy Technology

Program No: 10-482-1

Associate Degree in Applied Science

Degree Completion Time: Four Terms

2010-2011

Catalog No.	Class Title	Credit(s)
Term 1		
10482101	Intro to Wind Systems	3.00
10482102C1	Wind System Technician I	1.00
10620120	Basic Tools and Measurement	1.00
10620122	Practical Wiring Applications	1.00
10620159	Hydraulics I	2.00
10660105	DC Fundamentals	3.00
10804113	College Technical Mathematics 1A OR 10804115 College Technical Mathematics 1 (5 cr)	3.00
10804114	College Technical Mathematics 1B OR 10804115 College Technical Mathematics 1 (5 cr)	2.00
	Total	16.00
Term 2		
10660110	AC Fundamentals	3.00
10482102C2	Wind System Technician I	2.00
10620138	Programmable Controllers - Allen Bradley	3.00
10620141	Industrial Controls and Motors	3.00
10809196	Introduction to Sociology OR 10809195 Economics	3.00
	Total	14.00
Summer		
10482103	Wind Farm Internship	3.00
	Total	3.00
Term 3		
10620130	Mechanisms Mechanics Introduction to	3.00
10620140	Programmable Controllers - Allen Bradley Advanced	3.00
10620160	Hydraulics II	2.00
10620164	Electromechanical Systems	3.00
10801196	Oral/Interpersonal Communication	3.00
10806154	General Physics I	4.00
	Total	18.00
Term 4		
10482105	Wind System Technician II	3.00
10620147	Electronic Devices/Transducers	3.00
10620192	Industrial Codes Troubleshooting and Frequency Drive Procedures	3.00
10801195	Written Communication	3.00
10809198	Introduction to Psychology	3.00
	Total	15.00
	Program Total	66.00

Note: Program start dates vary; check with your counselor for details.

Curriculum and program acceptance requirements are subject to change.

About the Career

The wind energy industry is the fastest growing segment of renewable energy production. The U.S. and Canadian commercial wind farms are experiencing annual growth of 25%. Employers seek skilled technicians for operation and maintenance activities in local wind farm settings. There is also intense demand for upper-level technicians within U.S. and international wind turbine manufacturers; these include: installation technician, quality control technician, and warranty and commissioning technicians. Operation and maintenance positions remain with a given wind farm location; other technicians travel extensively with the development of new wind farms and repair/retrofitting of wind farms around the world.

Careers

- Wind Turbine Technician/Mechanic/Tower Climber
- Installation Technician
- Operation and Maintenance Technician
- Wind Farm Maintenance Manager

Admissions Steps

- Application
- Application Fee
- Entrance Assessment Scores
- Transcripts
- Program Advising Session

Program Goals

You'll learn to:

- Install, test, service and repair wind turbine components
- Troubleshoot and maintain control and PLC systems
- Troubleshoot and maintain SCADA systems
- Wear PPE for climbing and identify safety practices for climbing
- Practice safe wind turbine tower climbing skills

Other Program Expectations

You'll need to:

- See with normal or corrected vision
- Hear with normal or corrected hearing
- Lift up to 50 lbs.
- Stand for long periods of time
- Work outside in various climate conditions
- Walk and climb towers of 270 feet
- Have manual dexterity
- Have strong communication skills

Approximate Costs

- \$107 per credit (resident)
- \$158 per credit (out-of-state resident)
- Other fees vary by program (books, supplies, materials, tools, uniforms, and health-related exams)

Entrance Assessment Scores

Assessment Areas	ACT	Accuplacer
Math	18	79
Read	18	74
Write	18	86

Functional Abilities

Functional abilities are the basic duties that a student must be able to perform with or without reasonable accommodations. At the postsecondary level, students must meet these requirements, and they cannot be modified.

Transfer agreements are available with the following institutions:

Capella University
Lakeland College
Silver Lake College
University of Phoenix
UW-Stout

IMPORTANT: For more information on these agreements, visit gotoltc.edu/transfer.

10482101 Introduction to Wind Systems

...prepares the learner to assess the global energy picture; analyze the causes of wind and wind flow properties; explore small, medium, and large wind turbine designs; assess the environmental effects of wind turbines; perform business and site assessments for a wind turbine project, plan your wind turbine project, evaluate, operation and maintenance of the turbine system, and analyze the future of wind energy.

10482102 Wind Systems Technician 1

...allows participants to develop essential skills and attitudes for employment in the wind industry. Topics include: safety, electrical hazard, confined space, climbing practices, tool use, calibration, documentation and routine maintenance operations.

PREREQUISITE: 10482101 *Wind Systems Introduction* or 10468101 *Wind Systems Introduction* and 10620120 *Basic Tools and Measurement*, 10620122 *Practical Wiring*, 10620159 *Hydraulics I*, and 10660105 *DC Fundamentals*

10482103 Wind Farm Internship

...will allow participants to develop skill portfolios through hands-on activities in the maintenance, installation and troubleshooting of commercial wind turbines. Employment in the wind industry equires safe tower climbing practices beyond 300 feet. Internship locations vary across the United States. Extended travel is necessary.

PREREQUISITE: 10468102 *Wind Systems Technician I* or 10482102 *Wind Systems Technician I* and 10482102C1 *Wind Systems Technician I*, 10482102C2 *Wind Systems Technician I*, 10660110 *AC Fundamentals*, and 10620138 *Programmable Controllers-Allen Bradley*

10482105 Wind Systems Technician II

...allows participants to develop skills leading towards installation, repair and fine tuning technical electrical system of commercial wind turbines. Industry software, training manual and field trips create the course standards.

PREREQUISITE: 1048 2102C1 *Wind System Technician I* and 10482102C2 *Wind System Technician I* or 10482102 *Wind System Technician I* or 10468102 *Wind System Technician I* and 10620147 *Electronic Devices/Transducers* or 10660130 *Electronic Devices/Digital*

10620120 Basic Tools and Measurement

...prepares the learner to use hand tools, fasteners, and simple shaft alignments. Participants identify and describe the function and learn to adjust simple mechanisms.

10620122 Practical Wiring Applications

...prepares the learner to construct electrical circuits; measure electrical quantities using a VOM and/or DVM; analyze measured values using electrical circuit laws; construct typical residential circuits; and analyze typical residential electrical circuits.

COREQUISITES: 10660105 *DC Fundamentals* (3 cr) or 10660105C1 *DC Fundamentals* (3 cr)

10620130 Mechanisms Mechanics Introduction to

...prepares the learner to use tools and fasteners safely; identify belt and chain drive components; install and adjust belt and chain drives; apply bearing and lubrication information; perform coupling alignment using straight edge, feeler gauge, and dial indicator methods; identify various gear drives; calculate gear ratios; and analyze first-, second-, and third-class levers.

10620138 Programmable Controllers - Allen Bradley

...prepares the student to understand basic PLC structure and terminology; learn to create and troubleshoot basic PLC programs using the RSLOGIX 500 software and the RSLINX communication software; become familiar with communicating with and programming SLC-500 and Micrologix PLCs.

10620140 Programmable Controllers - Allen Bradley Advanced

...prepares the student to develop applications utilizing subroutine instructions, analog modules and RTD and Thermocouple modules; gain a basic understanding of creating and troubleshooting programs using the ControlLogix, RSLOGIX5000 software.

PREREQUISITE: 10620138 *Prog Cntrls/AB* or 10620138C1 *Prog Cntrls/AB* (3 cr)

10620141 Industrial Controls and Motors

...prepares the learner to select control devices by function and operation; illustrate electrical circuits using symbols, diagrams, and abbreviations; explain the operation of magnetic solenoids; apply motor control techniques; select relay type for industrial application; apply the basic rules of line and wiring diagrams; compare the types of timers and timing circuits used in control and explain the coding systems used; explain each type of control device and how it is used in an electrical circuit. Also prepares the learner to verify DC motor operational theories; select DC and AC motor types for general applications; identify AC motor components and wiring applications; verify single-phase operational theory; identify three phase motor components and wiring applications; verify three-phase motor operational theory; identify motor starting methods for industrial applications; verify electro-mechanical motor starting principals of operation; select the motor breaking method for industrial applications; verify the operational theory of speed and acceleration methods for motors used in industrial applications; design three-phase power motor circuits for industrial applications; design control circuits for three phase power motor circuits.

COREQUISITES: 10660110 *AC Fundamentals* or 10660110C1 *AC Fundamentals* (3 cr) or 10605110 *AC Fundamentals* or 10605110C1 *AC Fundamentals* (3 cr)

10620147 Electronic Devices/Transducers

...prepares the learner to evaluate characteristics of solid-state electronics, evaluate diodes and circuits, evaluate transistors and circuits, evaluate thyristor controlled circuits, interpret digital electronics terminology, convert among numbering systems used in digital electronics, evaluate the specifications, listed on a data sheet for an integrated circuit, evaluate operational amplifiers and circuits, analyze Digital-to-Analog (D/A), and Analog-to-Digital (A/D) devices and circuits.

COREQUISITES: 10660110 *AC Fundamentals* or 10660110C1 *AC Fundamentals* (3 cr) or 10605110 *AC Fundamentals* or 10605110C1 *AC Fundamentals* (3 cr)

10620159 Hydraulics 1

...prepares the learner to identify hydraulic component symbols; adjust a pressure relief valve; analyze the operation of a pilot operated relief valve; analyze Pascal's law; evaluate flow, velocity, work and power in industrial hydraulic circuits; analyze meter-in, meter-out, and bypass flow control circuits; evaluate the characteristics of hydraulic pumps, motors; directional and control valves; identify basic hydraulic control valves; and assemble hydraulic circuits.

10620160 Hydraulics II

...enhances the learner's ability to read schematics containing hydraulic component symbols; assemble a hydraulic system using a hydraulic schematic; analyze a hydraulic system's operation using a hydraulic schematic; evaluate the general characteristics and terms of hydraulic fluids, hydraulic conditioning (filtering), hydraulic fluid conductors, hydraulic reservoirs, hydraulic accumulators, hydraulic pressure control valves, and regenerative circuits; troubleshoot regenerative circuits; identify general types of accumulators; analyze the operation of hydraulic pressure control valves in various hydraulic circuits; apply manufacturer's specifications to test the main components of a hydraulic system; and troubleshoot a malfunctioning hydraulic system.

COREQUISITES: 10620159 *Hydraulics I* or 10620159C1 *Hydraulics* (2 cr)

10620164 Electromechanical Systems

...prepares the student to communicate with, tune, run and troubleshoot Allen-Bradley Ultra 3000 servos; utilize electrical control of hydraulic systems; explore PID control of motor speed; and investigate loop and closed loop control systems.

PREREQUISITES: 10620141 *Industrial Controls & Motors* or 10620141C1 *Industrial Controls & Motors* (3 cr) and 10620160 *Hydraulics II* or 10620160C1 *Hydraulics II* (2 cr) and 10620161 *Pneumatics I* **COREQUISITE:** 10620162 *Pneumatics*

10620192 Industrial Codes Troubleshooting and Frequency Drive Procedures

...prepares the learner to conduct effective machine control troubleshooting techniques; apply proper methods and specifications to install or replace a motor; and apply the National Electrical Code and the NFPA to practical motor installations. It also prepares the learner to explain the function and construction of a variable speed drive as well as program and modify the operational characteristics of the drive for practical applications.

PREREQUISITES: 10620141 *Motor Operation & Control* or 10620141C1 *Motor Operation & Control* (3 cr)

10660105 DC Fundamentals

...prepares the student to follow safety procedures; maintain a safe and healthy work environment; convert values to scientific and engineering notations; calculate math quantities; describe basic atomic theory; identify basic electrical terms; use established symbols standards; describe DC voltage characteristics and current sources and electrical resistance; measure and analyze electrical quantities in series and parallel circuits; and desolder/solder single and multi-lead components.

10660110 AC Fundamentals

...prepares the student to analyze electrical circuits using phasers and AC math, analyze AC waveforms, measure and analyze AC power, analyze capacitors and inductors in DC and AC circuits, analyze AC circuits containing reactance and calculate resonance, apply the elements and properties of basic measuring circuits, and describe transformer characteristics.

PREREQUISITES: 10660105 *DC Fundamentals* or 10660105C1 *DC Fundamentals* (3 cr) or 10605105 *DC Fundamentals* or 10605105C1 *DC Fundamentals* (3 cr)

10801195 Written Communication

...teaches the writing process, which includes prewriting, drafting, revising, and editing. Through a variety of writing assignments, the student will analyze audience and purpose, research and organize ideas, and format and design documents based on subject matter and content. Keyboarding skills are required for this course. It also develops critical reading and thinking skills through the analysis of a variety of written documents.

PREREQUISITE: 10831103 *Intro to College Writing* or **CONDITION:** *Accuplacer Writing minimum score of 86 or Equivalent*

10801196 Oral/Interpersonal Comm

...provides students with the skills to develop speaking, verbal and nonverbal communication, and listening skills through individual speeches, group activities, and other projects.

10804113 College Technical Mathematics 1A

...prepares the student to solve linear, quadratic, and relational equations; graph; formula rearrangement; solve systems of equations; percent; proportions; and operations on polynomials. Emphasis will be on the application of skills to technical problems. Successful completion of College Technical Mathematics 1A and College Technical Mathematics 1B is the equivalent of College Technical Mathematics 1.

PREREQUISITE: *Accuplacer Math minimum score of 79 or Equivalent* or 10804100 *Math Proficiency*

10804114 College Technical Math 1B

...is a continuation of College Technical Math 1A. Topics include: measurement systems; computational geometry; right and oblique triangle trigonometry; and trigonometric functions on the unit circle. Emphasis will be on the application of skills to technical problems. Successful completion of College Technical Mathematics 1A and College Technical Mathematics 1B is the equivalent of College Technical Mathematics 1.

PREREQUISITE: 10804196 *College Tech Math 1A*, or 10804109 *Algebra Computation* or **COREQUISITE:** 10804113 *College Tech Math 1A*

10806154 General Physics 1

...presents the applications and theory of basic physics principles. This course emphasizes problem-solving, laboratory investigation, and applications. Topics include unit conversions and analysis, vectors, translational and rotational kinematics, translational and rotational dynamics, heat and temperature, and harmonic motion and waves.

COREQUISITE: 10804197 *College Tech Math 1B* or 10804114 *College Tech Math 1B* or 10804115 *College Tech Math 1*

10809196 Introduction to Sociology

...introduces students to the basic concepts of sociology: culture, socialization, social stratification, multi-culturalism, and the five institutions, including family, government, economics, religion, and education. Other topics include demography, deviance, technology, environment, social issues, social change, social organization, and workplace issues.

10809198 Intro to Psychology

...introduces students to a survey of the multiple aspects of human behavior. It involves a survey of the theoretical foundations of human functioning in such areas as learning, motivation, emotions, personality, deviance and pathology, physiological factors, and social influences. It directs the student to an insightful understanding of the complexities of human relationships in personal, social, and vocational settings.