Industrial Education

INED 100 (P/T) 3 Credits
INTRO TO AUTOMATION/RENEWABLE
Quarters: Spring
This course introduces the student to various applications that are used in the automation and renewable energy field. The class includes practical experience in developing various basic mechanical systems. The systems include building basic gear transmission systems. Use Programmable Logic Controllers (PLCs) to manipulate drive and pneumatic processes, install small DC electric motors and pneumatic actuators, and use Photovoltaic cells and other DC electrical devices to build small-scale machines.

INED 101 (P/T) 3 Credits
INTRO TO BASIC TROUBLESHOOTING
Quarters: Winter, Spring
This course introduces to the student how to critically think regarding how to determine and fix problems with various machines, equipment and mechanical/electrical systems. Those machines, equipment and systems include, AC and DC electric motors, chain and belt drives, and building systems such as solar and HVAC equipment and electrical issues. Students are introduced to the use of basic troubleshooting diagnostic tools and learn the importance of preventing problems before they occur. Students gain practical troubleshooting experience by using critical thinking skills and diagnostic tools to detect and repair various problems on different machines and systems.

INED 103 (P/T) 3 Credits
MECHANICAL SYSTEMS
Quarters: Fall, Spring
This course focuses on learning the fundamentals of mechanical power. Students learn common mechanical components from nuts and bolts to gears, gear boxes, shafts, and bearings. Students perform common mechanical tasks, and learn to fine tune drive systems involving belts, chains, etc. This course demonstrates the importance of lubrication in maintaining gears and other movable parts, and emphasizes operations to reduce friction and wasted motion, which are major contributors to energy inefficiency. Students become acquainted with basic machine design, fabrication techniques and electrical/mechanical machine.

INED 104 (P/T) 3 Credits
ELECT SYSTEMS TROUBLESHOOTING I
Quarters: Fall
DC and AC electrical theory, definitions, basic component identification and analysis of polarity, series, parallel, combination circuits, direct current devices and batteries and their use in renewable applications. Emphasis is placed on practical application, troubleshooting, and problem solving. Students learn to troubleshoot common electrical problems in industry, such as low voltage, high voltage, open circuits, high resistance shorts to ground and current/voltage unbalance. Emphasis is on prevention of electrical waste.

INED 105 (P/T) 3 Credits
AIRBORNE CONTROL SYSTEMS
Quarters: Offered as needed
This course will serve as an overview of Unmanned Aerial Vehicle (UAV) theory of operations, component requirements, assembly and how electrical, mechanical, and computer sciences are part of each function. Topics covered will range from basic electrical and mechanical functions, Internal Navigation Systems (INS) and Global Positioning Systems (GPS) as it applies to UAV's, mission planning, and manual and autonomous operational requirements. Students will be exposed to current issues in the commercial UAS industry with particular focus on Oregon and the Pacific Northwest. Students will also learn through field tests of assembled equipment.

INED 107 (P/T) 3 Credits
ELECT SYSTEM TROUBLESHOOTING II
Quarters: Winter
This course covers the theory and application of magnetism, electromagnetism, the generation of elecomotive force, AC and DC motor principles, transformer theory, types and applications. Students are introduced to electrical troubleshooting methods and procedures to solve process problems. Analyzing motor control schematics and using advanced digital multi meters are stressed. Emphasis is on prevention and correction of energy wasting problems. Prerequisites: INED 104

INED 108 (P/T) 3 Credits
PRINCIPLES OF TECHNOLOGY
Quarters: Spring
Focuses on applying physical concepts and formulae to technology found in the industrial workplace. Students will develop and strengthen critical thinking and problem solving skills required to function and excel in rapidly changing and increasingly complex workplace environments. Lab experiments are intended to reinforce and enhance the scientific principles discussed in class as well as providing an opportunity to learn to work effectively in groups. The impact of technology on energy efficiency in the workplace is studied.

INED 109 (P/T) 3 Credits
HVAC SYSTEM CONTROLS
Quarters: Offered as needed
Students will learn the concepts of the basic operations of various heating and cooling systems for a variety of applications. This course focuses on maintenance and service procedures for initial tuning of HVACR systems for energy efficiency. Practical application of skills include: taking pressures, identifying refrigerants, recovering and recycling refrigerant, evacuating and charging refrigeration systems. Also included are all applicable safety precautions and EPA governed environmental regulations. Energy efficiency will be emphasized. Includes preparation for EPA certification, ESCO HVAC Excellence program.

INED 111 (P/T) 2 Credits
PREVENTIVE MAINTENANCE/ENERGY CONSE
Quarters: Offered as needed
Examines the development and implementation of a preventive maintenance program using proven actions and procedures and common computer software. Students will learn how to design, construct, and maintain industrial transfer systems. The emphasis of this course is the application of preventive maintenance strategies to increase efficiency.

INED 112 (P/T) 3 Credits
CONTROL SYSTEMS
Quarters: Fall
Students will learn fundamentals of programmable logic control (PLC) operation, and troubleshooting. Variable speed drive operation and programming is covered as are process control principles for temperature and flow. Emphasis is on understanding of control operations for efficiency.

INED 113 (P/T) 2 Credits
BASIC HYDRAULICS
Quarters: Fall
Use of various forms of fluids to produce power and to do mechanical work. Basics of hydropower systems such as design types, systems, and suitability. Students will do a site investigation, measure head pressure, flow rate, calculate the power contained in moving water, and investigate the fundamental principles of operations of hydraulic and pneumatic systems. Includes schematics, troubleshooting, maintenance, and components of systems such as pumps, valves, cylinders, and motors. Emphasis will be on operation of fluid power systems for energy savings and pollution controls.

INED 114 (P/T) 3 Credits
BASIC PNEUMATICS
Quarters: Winter
Provides instruction in the fundamental principles of pneumatic systems. Investigates the basic components of pneumatic systems such as pumps, valves, cylinders, and motors.

INED 115 (P/T) 3 Credits
PROCESS CONTROL AND INSTRUMENTATION
Quarters: Winter
Provides an introduction to process control and instrumentation. Students will develop a working production line that includes sensors, pneumatics, PLCs, and motor controls. Energy efficiency and maintenance, troubleshooting, and repair of control systems is emphasized. Some sections may have a low-cost text book option.

INED 116 (P/T) 3 Credits
FLUID POWER I
Quarters: Offered as needed
Use of various forms of fluids to produce power and to do mechanical work. Basics of hydropower systems such as design types, systems, and suitability. Students will do a site investigation, measure head pressure, flow rate, calculate the power contained in moving water, and investigate the fundamental principles of operations of hydraulic and pneumatic systems. Includes schematics, troubleshooting, maintenance, and components of systems such as pumps, valves, cylinders, and motors. Emphasis will be on operation of fluid power systems for energy savings and pollution controls.

INED 156 (P/T) 3 Credits
EMPLOYMENT STRATEGIES
Quarters: Offered as needed
Prepares students to create a resume and cover letter, research internet job sources and job search techniques, prepare a portfolio of work examples, and contact potential employers. Provides practical experience through "mock interviews". Discusses appropriate dress for interviews. Includes different work place personality types and conflict resolution.

INED 157 (P/T) 2 Credits
EMPLOYMENT STRATEGIES
Quarters: Fall, Winter, Spring
This course prepares students to create a resume and cover letter, research internet job sources and job search techniques, prepare portfolio of work examples and contact potential employers. Provides practical experience through mock interviews -via a variety of methods. discusses appropriate preparation for interviews- including: phone interviews, skype interviews, appropriate dress, portfolio building. Includes strength based career seeking and working with varied personalities in the work place. Some sections may have a low-cost text book option.

INED 167 (P/T) 4 Credits
CAD I 2D DRAWING
Quarters: Spring
Introduces Auto CAD program, including 2D drawing, editing, display commands and functions, layer management, and line types and colors. Covers multi and auxiliary view layout and prototype drawing creation. Applies the AutoCAD program to mechanical, schematic, and architectural drawings.

INED 203 (P/T) 4 Credits
ADVANCED MECHANICAL SYSTEMS
Quarters: Offered as needed
Learn to troubleshoot, maintain and repair drive systems; bearings and lubrications systems; and industrial pumps and valves. Fundamentals of vibration and oil analysis, shaft alignment, handling and mounting bearings, and operating lubrication systems. Emphasis is placed on effective maintenance of belt, chain, and gear drives for maximum energy efficiency. Appropriate pump and valve selection and print reading for correct installation is stressed. Prerequisites: INED 103

INED 212 (P/T) 3 Credits
INDUSTRIAL SAFETY AND MANAGEMENT
Quarters: Fall, Spring
Examines and identifies prevention methods for various hazards associated with industry. Areas examined include machinery, environmental, and confined spaces. Safety management and governmental compliance will also be addressed.

INED 213 (P/T) 3 Credits
ADVANCED CONTROL SYSTEMS
Quarters: Fall
Develop advanced skills in programming PLCs. Students will learn to convert common industrial control circuits to PLC ladder logic as well as create programs from narrative description. Special emphasis will be placed on interfacing the PLC with a selection of electro-pneumatic control devices. Also covered are interpreting PLC data sheets and systemic approach to testing and troubleshooting of PLC programs.

INED 225 (P/T) 4 Credits
STRUCTURE AND FABRICATION II
Quarters: Offered as needed
Entry level class that covers safety and basic knowledge of Industrial Structures, including blue print reading and shop drawing: using various ways to bond material together. Students will be introduced to the fundamental principles of MIG welding, TIG welding, and Plasma cutting. This course demonstrates the importance of common construction techniques as they relate to a variety of building materials. This may include materials such as wood, plastics, metal, concrete, and other composites.

INED 280 (P/T) 6 Credits
INDUSTRIAL COOP WORK EXP
Quarters: Summer, Fall, Winter, Spring
Applies actual work experience in a related Career & Technical field. An on-site supervisor evaluates and supervises the work experience student. Requires instructor approval of work setting and placement. Documentation of 36 worksite hours for each credit earned.