

Energy Systems Mechanical Engineering Technology

4 Semesters

Coordinator and Instructor: Beaty

Instructors: Larson, McClure, Shepherd, Womack

One Associate of Applied Science degree and one Bachelor of Applied Technology degree are available.

Objective:

To prepare students for employment as mechanical engineering technicians in electrical power generation fields. Electrical generation technologies addressed include nuclear, coal, gas, and renewable technologies.

Acceptance is based upon available openings and other factors such as grade point average and attendance.

For a Program Information Packet, visit <http://www.isu.edu/ctech/programs.shtml>, which leads to descriptions of each program in general, course descriptions, lists of course sequences, and a cost of books, tools, uniforms, fees, and other expenses.

This program requires students to achieve certain grades in order to advance each semester. Specific information is available in the program's student handbook.

Associate of Applied Science Degree: Energy Systems Mechanical Engineering Technology

4 Semesters

Students must register concurrently for the lab course associated with each theory course.

Required Courses:

ESET 120, 120L	Introduction to Energy Systems, and Lab	3 cr
ESET 121, 121L	Basic Electricity and Electronics, and Lab	8 cr
ESET 122, 122L	Electrical System and Motor Control Theory, and Lab	3 cr
ESET 123, 123L	Mechanical Power Transmission, and Lab	7 cr
ESET 124	Mechanical System and Machine Design	2 cr
ELTR 141	Applied Mathematics I	4 cr
ELTR 142	Applied Mathematics II	4 cr
ESET 240, 240L	Pumps, and Pump Applications Laboratory	7 cr
ESET 241, 241L	Valves, and Valve Application Laboratory	6 cr
ESET 242	Process Measurement for Mechanical Engineering	2 cr
ESET 243, 243L	Fluid and Pneumatic Power and Lab	5 cr
ESET 244	Rotating Equipment Maintenance	4 cr
ESET 244L	Machine Alignment	3 cr
ESET 245	Fundamentals of Heat Exchangers	2 cr
ESET 246	Metals and Metallurgy	2 cr
ESET 298	Independent Study	1-8 cr
MATH 253*	Introduction to Statistics	3 cr
TGE 158	Employment Strategies	2 cr

General Education Requirements **

ENGL 101	English Composition	3 cr
COMM 101	Principles of Speech	3 cr
PHYS 101, 101L	Elements of Physics, and Lab	4 cr
Goal 6, 7, 9, 10A, 11, or 12	3 cr	Total 81-88 cr

**MATH 170 may be substituted for MATH 253.*

***Of the 16 credits of General Education coursework required for the degree, 13 credits are part of the required curriculum.*

Official articulation agreements have been established with other post-secondary and secondary schools. Where these agreements exist, the specific block of training (i.e. session/semester/year) will be accepted as equivalent to that taught at Idaho State University and will count equally toward graduation.

The courses listed above will be taught in sequential blocks of instruction. Successful completion of a course is required before the student can progress in the program. If the student fails any math, theory, or lab course, then that course must be repeated and a passing grade obtained before the student can advance in the program. The student must exit the program and make up the deficiency through Technical General Education or other appropriate methods. The student will then be allowed to repeat the course at the next available program opening.

Once a student successfully completes ELTR 141 and 142, Applied Mathematics I and II, s/he may enroll directly into an academic math course which requires MATH 147 as a prerequisite.

Courses

ESET 120 Introduction to Energy Systems 2 credits. Basic terminology and functions of power generation processes, equipment, and material. Introduction to Rankin, Carnot, and Brayton cycles and principles of heat transfer and fluid flow. COREQ: ESET 120L. F

ESET 120L Introduction to Energy Systems Laboratory 1 credit. Laboratory exercises in the maintenance and function of selected power plant process equipment, primary process equipment, and their sub-components. COREQ: ESET 120. F

ESET 121 Basic Electricity and Electronics 4 credits. Fundamental principles of electricity, Ohm's law, Kirchoff's laws, and circuit analysis applied to DC and AC circuits. COREQ: ESET 121L. F

ESET 121L Basic Electricity and Electronics Laboratory 4 credits. Basic principles of electrical measurement and testing of DC and AC Circuits. COREQ: ESET 121. F

ESET 122 Electrical Systems and Motor Control Theory 2 credits. Introduction to electrical system distribution and basic motor control including two- and three-wire control using a variety of devices and motor magnetic controllers. Control relays, time relays, solenoid valves, latching relays, and motor control centers. PREREQ: ESET 121 and ESET 121L or permission of instructor. COREQ: ESET 122L. S

ESET 122L Electrical Systems and Motor Control Theory Laboratory 1 credit. Applications of electrical systems and motor controls. PREREQ: ESET 121 and ESET 121L or permission of instructor. COREQ: ESET 122. S

ESET 123 Mechanical Power Transmission 3 credits. Bearings, belt and mechanical drives, chain and chain drives, couplings, clutches, gears, and fluids in the transmission of power used in the industrial processes. PREREQ: ESET 121 and ESET 121L or permission of instructor. COREQ: ESET 123L. S

ESET 123L Mechanical Power Transmission Laboratory 4 credits. The application of bearings, belt and mechanical drives, chain and chain drives, couplings, clutches, gears, and fluids in the transmission of power used in the industrial processes. PREREQ: ESET 121 and ESET 121L or permission of instructor. COREQ: ESET 123. S

ESET 124 Mechanical Systems and Machine Design 2 credits. Design considerations for machine elements used in mechanisms and machines, including advanced strength of materials; material selection; shaft design; selection of gear, chain, and belt drives; design and selection of bearings; design of brakes and clutches; and characteristics and selection of electric motors. PREREQ: ESET 122. S

ESET 240 Pumps 4 credits. Introductory hydraulic engineering concepts that pertain to centrifugal pumps, including pump seals, packing techniques, and bearings. Operation and maintenance of various industrial pump types. Emphasis on centrifugal pump maintenance and repair. PREREQ: ESET 123 and ESET 123L or permission of instructor. COREQ: ESET 240L. F

ESET 240L Pump Applications Laboratory 3 credits. Applications in the installation, testing, and maintenance of various pump types. PREREQ: ESET 123 and ESET 123L or permission of instructor. COREQ: ESET 240. F

ESET 241 Valves 4 credits. Introduction to basic construction, components, materials, and function of valve types common to power generation systems. PREREQ: ESET 123 and ESET 123L or permission of instructor. COREQ: ESET 241L. F

ESET 241L Valve Applications Lab 2 credits. Applications of valve installation and maintenance including valve disassembly, reassembly, maintenance, and quality control practices. PREREQ: ESET 123 and ESET 123L or permission of instructor. COREQ: ESET 241. F

ESET 242 Process Measurements for Mechanical Engineering 2 credits. Principles of temperature, pressure, strain, flow, force, and vibration measurements. Techniques of computerized data acquisition and reduction. Lecture plus laboratory work in selected topics. F

ESET 243 Fluid and Pneumatic Power 3 credits. Review fluid and pneumatic power mechanics with an emphasis on symbology, circuit operation and design, pneumatic and hydraulic component operation, and terminology. PREREQ: ESET 123 and ESET 123L or permission of instructor. COREQ: ESET 243L. F

ESET 243L Fluid and Pneumatic Power Laboratory 2 credits. Applications of fluid and pneumatic power mechanics with an emphasis on symbology, circuit operation and design, pneumatic and hydraulic component operation, and terminology. PREREQ: ESET 123 and ESET 123L or permission of instructor. COREQ: ESET 243. F

ESET 244 Rotating Equipment Maintenance 4 credits. Predictive maintenance techniques as a tool for prolonging equipment life and preventing problems. Includes vibration, lubricant and trend analysis techniques for extending bearing life. Machine, shaft, and gear alignment practices and methods as a procedure to extend the life of bearings, couplings, seals, and to reduce vibration in equipment, components and gears. PREREQ: ESET 123 and 124. S

ESET 244L Machine Alignment 3 credits. Applications and use of tools and equipment used in the alignment process. Includes use of dial indicators and electronic and laser measuring devices. PREREQ: ESET 124 or permission of instructor. S

ESET 245 Fundamentals of Heat Exchangers 2 credits. Introduces construction of various heat exchanger types and their operation. Includes flow patterns, temperature profiles, and analysis techniques to determine performance and efficiency. S

ESET 246 Materials and Metallurgy 2 credits. Lecture, demonstration, and laboratory emphasizing the practical approach to basic principles of materials and metallurgical science, including behavior of materials under various conditions. S