



**COWLEY COLLEGE
& Area Vocational Technical School**

COURSE PROCEDURE FOR

**MECHANICAL SYSTEMS
MEC3489 3 Credit Hours**

Student Level:

This course is open to high school and post-secondary level students.

Catalog Description:

MEC 3489 - MECHANICAL SYSTEMS (3 hrs)

This course develops students' understanding of the basic concepts of mechanical physical properties relating to Mechanical Systems. Students will explore these concepts as they relate to mechanical, electrical, fluid (hydraulic and pneumatic), and communications systems, as well as to the operation of commonly used tools and equipment.

Prerequisites:

None

Controlling Purpose:

This course is designed to help the student develop understanding of the basic concepts of mechanical physical properties relating to Mechanical Systems.

Learner Outcomes:

Upon completion of the course, the student will be able to demonstrate proficiency in mechanical, electrical, fluid (hydraulic and pneumatic), and communications systems, as well as the operation of commonly used tools and equipment. They should be able to develop scientific-inquiry skills as they verify accepted laws of physics impacting the technological applications of mechanical systems as it applies to safety and the environment.

The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

Units Outcomes and Criterion Based Evaluation Key for Core Content:

The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:

- A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.
- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

UNIT 1: Mechanical Systems Introduction						
Outcomes: Upon completion of this unit, the student will be able to successfully apply basic physics to real-world scenarios.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Conceptualize on the ideas of force and applications in daily life by examining the factors affecting friction.
						Analyze all forces acting on an object and through Newton's laws, explain the resulting motion of the object. Newton's laws are verified experimentally.
						Understand and use force concepts as applied to simple machines such as the lever, the inclined plane, and modifications of these.
						Determine the mechanical advantage of several devices and recognize the need for simple machines.
						Explain the functions of forces and mechanical advantage found in devices such as robotic equipment.
						Design and build a simple machine in order to solve a practical problem.

UNIT 2: Fluids, Electricity and Electronics Role in Mechanical Systems

Outcomes: Upon completion of this unit, the student will be able to successfully apply higher level physics to specific systems.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Apply hydraulic and pneumatic systems in the world around them and then go on to investigate the physical principles involved, such as Bernoulli's and Pascal's principles.
						Investigate these principles through experiments and analyze quantitatively the work, power, and time involved in hydraulic and pneumatic circuits.
						Design, construct, and evaluate a model hydraulic or pneumatic system.
						Develop their skills with electric circuits by examining the theoretical aspects of circuits through the analysis of circuit problems involving potential difference, current, and resistance.
						Assemble circuits and measure voltage, current, and resistance values at various points throughout the circuit to reinforce Ohm's law for fixed resistances and Kirchhoff's law.
						Explore the operations of electronic control devices as well as analog and digital circuits and electrical sub-circuits.
						Employ knowledge of circuit theory to design, build, and test a circuit that performs a simple function.
						Choose and electric component of a typical "system" found at home or at work, and describe its operation.

UNIT 3: Communications Technology

Outcomes: Upon completion of this unit, the student will be able to successfully understand the application of light to communications.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Understand various communication technologies and their roles in systems.
						Comprehend the properties of periodic motion and the behavior of waves through direct experimentation.
						Investigate the refraction of light by verifying Snell's Law.
						Describe and explain how the phenomena of reflection and interference of sound waves as well as the reflection, refraction, and interference of light and of electromagnetic waves are employed in modern day communication science.
						Employ knowledge of communication science and electronics to design, build, and demonstrate the operation of a simple communication system.

UNIT 4: Energy Transformations and Control of System Variability

Outcomes: Upon completion of this unit, the student will be able to successfully understand the transfer between power carrying mediums.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Examine various systems that convert one form of energy to another.
						Apply the knowledge of energy transfer systems and use the results to design a device for a particular function that utilizes at least four functional energy transfers.
						Evaluate the advantages and disadvantages of energy transforming devices that are based on renewable resources.
						Describe the variability found in manufacturing systems today and assess common and emerging technologies as solutions including, dynamic feedback, quality control and tolerances.

UNIT 5: Laboratory

Outcomes: Upon completion of this unit, the student will be able to successfully synthesize knowledge using hands-on techniques.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Use computer simulation software to design, test and troubleshoot mechanical systems components and circuits.
						Use training units to complete a series of activities studying mechanical and electronic component operating characteristics as well as learning to plumb, operate, and test basic mechanical/electronic system circuits.

UNIT 6: Analysis of a Mechanical System Application

Outcomes: Upon completion of this unit, the student will be able to successfully understand the application of systems to the real world.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Prepare a report on a piece of equipment that uses components of a mechanical system.
						Include a minimum of four references from technical and popular sources.
						Describe the equipment, its function, and where the mechanical system is used in its operation.
						Show how circuit diagrams of the various components of a mechanical system and photographs and drawings of the equipment can be helpful in analyzing the report.
						Analyze and report why one mechanical system was used in the application instead of another power-transmission method.

Projects Required:

As assigned

Textbook:

Contact Bookstore for current textbook.

Materials/Equipment Required:

None

Attendance Policy:

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DISCLAIMER: THIS INFORMATION IS SUBJECT TO CHANGE. FOR THE OFFICIAL COURSE PROCEDURE CONTACT ACADEMIC AFFAIRS.

Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

Grading Policy:

The grading policy will be outlined by the instructor in the course syllabus.

Maximum class size:

Based on classroom occupancy

Course Timeframe:

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

Refer to the following policies:

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

Disability Services Program:

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.