



HEMR 1371 - Natural Gas Maintenance and Troubleshooting 1H1 Course Syllabus

Description

Introduction into CNG compression and pumps, valves, snap controllers, compressor maintenance and repair. Including the diagnostics and troubleshooting of natural gas compressors, and engines.

Credits 3

Lecture Hours 2

Lab Hours 3

Extended Hours 0

Contact Hours 80

State Approval Code 47.0302

Instructor Name DANIEL HALL

Semester/Year Spring 2025

Meeting Time and Location

Thursdays 3:25-5:30 PM MEB 1110

Alternate Operations During Campus Closure

In the event of an emergency or announced campus closure due to a natural disaster or pandemic, it may be necessary for Panola College to move to altered operations. During this time, Panola College may opt to continue delivery of instruction through methods that include, but are not limited to: online learning management system (CANVAS), online conferencing, email messaging, and/or an alternate schedule. It is the responsibility of the student to monitor Panola College's website (www.panola.edu) for instructions about continuing courses remotely, CANVAS for each class for course-specific communication, and Panola College email for important general information.

Student Basic Needs

Unexpected circumstances may arise, but Panola College offers various resources to support students. If you need mental health services or are facing challenges with transportation, affording class materials and supplies, or accessing food regularly—issues that may impact your class performance—please visit panola.edu/resources.

Class Attendance

Regular and punctual attendance of classes and laboratories is required of all students. When a student has been ill or absent from class for approved extracurricular activities, he or she should be allowed, as far as possible, to make up for the missed work. If a student has not actively participated by the census date, they will be dropped by the instructor for non-attendance. This policy applies to courses that are in-person, online, hybrid, and hybrid.

Attendance in online courses is determined by submission of an assignment or participation in an activity. According to federal guidelines, simply logging into a distance learning course without participating in an academic assignment does not constitute attendance. Distance learning is defined as when a majority (more than 50%) of instruction occurs when the instructor and students are in separate physical locations. Students must engage in an academic activity prior to the course census date.

When an instructor feels that a student has been absent to such a degree as to invalidate the learning experience, the instructor may recommend to the Vice President of Instruction that the student be withdrawn from the course. Instructors may seek to withdraw students for non-attendance after they have accumulated the following number of absences:

Fall or spring semesters:

3 or more class meeting times per week - 5 absences

2 class meeting times per week - 3 absences

1 class meeting per week - 2 absences

The student is responsible for seeing that he or she has been officially withdrawn from a class. A student who stops attendance in a class without officially withdrawing from that class will be given a failing grade; consequently, the student must follow official withdrawal procedures in the Admissions/Records Office.

Please note: Health Science and Cosmetology courses may require more stringent attendance policies based on their accreditation agencies. Please see the addendum and/or program handbook for further information concerning attendance.

Pregnant/Parenting Policy

Panola College welcomes pregnant and parenting students as a part of the student body. This institution is committed to providing support and adaptations for a successful educational experience for pregnant and parenting students. Students experiencing a need for accommodations related to pregnancy or parenting will find a Pregnancy and Parenting Accommodations Request form in the Student Handbook or may request the form from the course instructor.

Artificial Intelligence (AI) Course Policy

Use of generated AI Permitted under some classroom circumstances with permission.

There are situations throughout the course where you may be asked to use artificial intelligence (AI) tools to explore how they can be used. Outside of those circumstances, you should not use AI tools to generate content that will end up in any student work (assignments, activities, discussion responses, etc.). In such cases for Option #2, no more than 25% of the student work should be generated by AI. Use of any AI-generated content in this course without the instructor's consent qualifies as academic dishonesty and violates Panola College's standards of academic integrity.

Instructional Goals and Purposes

Identify and demonstrate proper preventive maintenance on a natural gas compressor skid including changing oil, fluids, filters, valves, setting valve lash, checking for leaks, identifying future maintenance issues. Performing bearing runout and replacement. This course serves as the capstone for the AAS Natural Gas Compression Degree.

Learning Outcomes

1. Demonstrate proper use of fine measuring tools to check bearing life and to check clearances on parts.
2. Demonstrate setting valve lash on a natural gas engine.
3. Demonstrate the removal and reinstallation of a compression valve.
4. Performing general preventive maintenance on a natural gas compression skid.
5. Troubleshoot potential problems on a natural gas compression skid.
6. Identify potential hazards and perform proper lockout and tagout of the driver and compressor.

Specific Course Objectives (includes SCANS)

After studying all materials and resources presented in the course, the student will be able to:

1. Demonstrate proper use of fine measuring tools to check bearing life and to check clearances on parts. (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Demonstrate deflection method of bearing runout measurement.
 - b. Demonstrate how to use a dial indicator.
 - c. Determine when a bearing must be replaced.
 - d. Demonstrate the removal and installation of a bearing.

- e. Demonstrate how to set up and use a dial indicator.
 - f. Describe how to read a dial indicator.
 - g. Describe how to read a caliper
 - h. Describe how to read a micrometer.
 - i. Demonstrate using a caliper and micrometer to measure a mechanical part.
2. Demonstrate the removal and reinstallation of a compression valve(1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Demonstrate proper safety precautions prior to valve removal.
 - b. Demonstrate removal of a compressor valve.
 - c. Demonstrate troubleshooting and disassembling a compressor valve.
 3. Setting valve lash on a natural gas engine.(1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Demonstrate how to measure valve lash on an engine.
 - b. Set the valve lash on a natural gas engine.
 4. Performing general preventive maintenance on a natural gas skid. (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Identify all maintenance intervals associated with the engine and compressor.
 - b. Perform a general PM to a compressor skid.
 - c. Identify the different types of lubricants associated with a natural gas compressor.
 - d. Describe the different specifications of industrial lubricants.
 - e. Change the lubricant and fluids on a natural gas skid.
 5. Troubleshooting potential problems on a natural gas skid.(1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Identify potential future problems and maintenance issues on a skid
 - b. Troubleshoot engine controls
 - c. Troubleshoot compressor oil system
 - d. Troubleshoot compressor pressure measurement devices.
 6. Identify potential hazards and perform proper lockout and tagout of the driver and compressor.(1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C- ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. List the potential hazards associated with a natural gas compressor.
 - b. Demonstrate locking and tagging all fuel and energy sources on the skid.
 - c. Demonstrate proper logging of information associated with lockout and tagout.

Course Content

A general description of lecture/discussion topics included in this course are listed in the Learning Objectives / Specific Course Objectives sections of this syllabus.

Students in all sections of this course will be required to do the following:

1. Students will study assigned materials and complete quizzes and exams to assess understanding and comprehension.
2. Students will complete all lab assignments as scheduled and all students are required to wear Personal Protective Equipment (PPE) in the lab.

Methods of Instruction/Course Format/Delivery

Students in traditional, hybrid and Internet classes will have access to courses via Canvas. Students in the traditional class will meet regularly for lectures. Students in the Internet class will be required to take quizzes and exams at an approved testing facility or, they may also be administered by the instructor. Students in hybrid classes will have both in class and online assignments. Hybrid classes are required to read assigned material, take quizzes and exams as assigned by the instructor, and complete assigned homework prior to meeting for the face to face labs. Resources for this course, provided through Canvas, include the following Sections in Canvas...

- Modules: Chapter study materials, self-assessment exercises, quizzes and exams
- Announcements and Recent Activities List: Instructor Announcements
- Inbox: Email (to communicate with instructor and classmates inside Canvas)
- Grades: Student grades

- Other sections, as assigned by the Instructor: Students in both the traditional and Internet classes should use the People feature within Canvas (includes Canvas Email) to communicate with the instructor. Using Canvas Email located in the "In Box" menu, gives the student access to the instructor and other classmates without having to remember or type email addresses; the student just selects a name from the list. The instructor will attempt to respond to all Canvas emails within 24 hours. For example, if a student makes an appointment with the instructor through Canvas email to take an exam, the instructor will reply to the student's Canvas email – if the instructor does not reply within the time needed, call the instructor at his or her office. Please, always include in the subject line of the Canvas email, the student's name have course number and course section number.

Major Assignments/Assessments

The following items are assigned and assessed during the semester and used to calculate the student's final grade.

Course Grade

The grading scale for this course is as follows:

Category Percentage:

Exams = 40%

Quizzes = 30%

Lab Exercises = 20%

Attendance = 10%

Other

- Courses conducted via video conferencing may be recorded and shared for instructional purposes by the instructor.
- For current texts and materials, use the following link to access bookstore listings: <https://www.panolacollegestore.com>.
- For testing services, use the following link: <https://www.panola.edu/student-services/student-support/academic-testing-center>.
- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Charles C. Matthews Student Center or go to <https://www.panola.edu/studentservices/student-support/disability-support-services> for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook: <https://www.panola.edu/> (located on at the bottom under student)

SCANS Criteria

1. Foundation skills are defined in three areas: basic skills, thinking skills, and personal qualities.
 - a. Basic Skills: A worker must read, write, perform arithmetic and mathematical operations, listen, and speak effectively. These skills include:
 - i. Reading: locate, understand, and interpret written information in prose and in documents such as manuals, graphs, and schedules.
 - ii. Writing: communicate thoughts, ideas, information, and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.
 - iii. Arithmetic and Mathematical Operations: perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.
 - iv. Listening: receive, attend to, interpret, and respond to verbal messages and other cues.
 - v. Speaking: Organize ideas and communicate orally.
 - b. Thinking Skills: A worker must think creatively, make decisions, solve problems, visualize, know how to learn, and reason effectively. These skills include:
 - i. Creative Thinking: generate new ideas.

- ii. Decision Making: specify goals and constraints, generate alternatives, consider risks, and evaluate and choose the best alternative.
- iii. Problem Solving: recognize problems and devise and implement plan of action.
- iv. Visualize ("Seeing Things in the Mind's Eye"): organize and process symbols, pictures, graphs, objects, and other information.
- v. Knowing How to Learn: use efficient learning techniques to acquire and apply new knowledge and skills.
- vi. Reasoning: discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.
- c. Personal Qualities: A worker must display responsibility, self-esteem, sociability, self management, integrity, and honesty.
 - i. Responsibility: exert a high level of effort and persevere toward goal attainment.
 - ii. Self-Esteem: believe in one's own self-worth and maintain a positive view of oneself.
 - iii. Sociability: demonstrate understanding, friendliness, adaptability, empathy, and politeness in group settings.
 - iv. Self-Management: assess oneself accurately, set personal goals, monitor progress, and exhibit self-control.
 - v. Integrity and Honesty: choose ethical courses of action.
- 2. Workplace competencies are defined in five areas: resources, interpersonal skills, information, systems, and technology.
 - a. Resources: A worker must identify, organize, plan, and allocate resources effectively.
 - i. Time: select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
 - ii. Money: Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
 - iii. Material and Facilities: Acquire, store, allocate, and use materials or space efficiently. Examples: construct a decision timeline chart; use computer software to plan a project; prepare a budget; conduct a cost/benefits analysis; design an RFP process; write a job description; develop a staffing plan.
 - b. Interpersonal Skills: A worker must work with others effectively.
 - i. Participate as a Member of a Team: contribute to group effort.
 - ii. Teach Others New Skills.
 - iii. Serve Clients/Customers: work to satisfy customer's expectations.
 - iv. Exercise Leadership: communicate ideas to justify position, persuade and convince others, responsibly challenge existing procedures and policies.
 - v. Negotiate: work toward agreements involving exchange of resources, resolve divergent interests.
 - vi. Work with Diversity: work well with men and women from diverse backgrounds. Examples: collaborate with a group member to solve a problem; work through a group conflict situation, train a colleague; deal with a dissatisfied customer in person; select and use appropriate leadership styles; use effective delegation techniques; conduct an individual or team negotiation; demonstrate an understanding of how people from different cultural backgrounds might behave in various situations.
 - c. Information: A worker must be able to acquire and use information.
 - i. Acquire and Evaluate Information.
 - ii. Organize and Maintain Information.
 - iii. Interpret and Communicate Information.
 - iv. Use Computers to Process Information. Examples: research and collect data from various sources; develop a form to collect data; develop an inventory record-keeping system; produce a report using graphics; make an oral presentation using various media; use on-line computer databases to research a report; use a computer spreadsheet to develop a budget.
 - d. Systems: A worker must understand complex interrelationships.
 - i. Understand Systems: know how social, organizational, and technological systems work and operate effectively with them.
 - ii. Monitor and Correct Performance: distinguish trends, predict impacts on system operations, diagnose deviations in systems' performance and correct malfunctions.

- iii. Improve or Design Systems: suggest modifications to existing systems and develop new or alternative systems to improve performance. Examples: draw and interpret an organizational chart; develop a monitoring process; choose a situation needing improvement, break it down, examine it, propose an improvement, and implement it.
- e. Technology: A worker must be able to work with a variety of technologies.
 - i. Select Technology: choose procedures, tools or equipment including computers and related technologies.
 - ii. Apply Technologies to Task: understand overall intent and proper procedures for setup and operation of equipment.
 - iii. Maintain and Troubleshoot Equipment: Prevent, identify, or solve problems with equipment, including computers and other technologies. Examples: read equipment descriptions and technical specifications to select equipment to meet needs; set up and assemble appropriate equipment from instructions; read and follow directions for troubleshooting and repairing equipment.