



STARK STATE COLLEGE

GENERAL SYLLABUS

Course Information

Course Name: Field Service Operations
Course Number: ARL230

Required Materials

Textbook(s): Field Service Operations Handbook Ariel Corp.
Required Readings: None
Additional Materials: Scientific Calculator, Laptops, Note Pads, Writing Utensils, Web Links, Handouts and related items as provided in class.

Course Outline/Calendar

The date of coverage and order of coverage may be modified based on the faculty member and events beyond the control of faculty members that interfere with class times and teaching.

Week	Chapter/Topic/Lab
1: Introduction to Compressors and Safety	<ul style="list-style-type: none"> ○ Topics: Compressor classifications and operational theory (ejector, radial, axial, reciprocating, rotary screw), industry terminology, and components. ○ Safety Focus: Occupational Safety and Health Administration (OSHA) requirements for compressors, personal protective equipment (PPE), lockout/tagout (LOTO) procedures, and understanding chemical hazards (e.g., refrigerants, oils).
2: System Components and Schematics	<ul style="list-style-type: none"> ○ Topics: Detailed breakdown of compressor parts (crankshafts, pistons, valves, impellers), auxiliary equipment (coolers, separators, controls), and lubrication systems. ○ Practical skills: Interpreting mechanical and electrical schematics, identifying key components, and utilizing parts manuals.
3: Principles of Instrumentation and Controls	<ul style="list-style-type: none"> ○ Topics: Operation and function of control panels, instrumentation (gauges, sensors, transducers), safety controls, and system monitoring. ○ Practical skills: Proper calibration techniques for sensors and gauges, as well as basic electrical circuit troubleshooting.
4: Fluid Dynamics and Thermodynamics	<ul style="list-style-type: none"> ○ Topics: Foundational principles of gas compression, heat transfer, and the relationship between pressure, temperature, and volume. ○ Practical skills: Using diagnostic tools to measure and interpret pressure and temperature readings at various points in the system.
5: Reciprocating Compressor Maintenance	<ul style="list-style-type: none"> ○ Topics: Maintenance procedures for reciprocating compressors, including force-feed lubrication systems, compressor valves, and pistons. ○ Hands-on: Performing maintenance on lubrication systems and replacing compressor valves, documenting "as found" and "as left" conditions.
6: Reciprocating Compressor	<ul style="list-style-type: none"> ○ Topics: Disassembling, inspecting, and reassembling major components of a reciprocating compressor.

Week	Chapter/Topic/Lab
Teardown and Analysis	<ul style="list-style-type: none"> ○ Hands-on: Performing a full teardown of a salvaged compressor unit to analyze failed components and identify root causes.
7: Advanced Reciprocating Compressor Troubleshooting	<ul style="list-style-type: none"> ○ Topics: Advanced diagnostic methods for identifying engine and compressor failures, with a focus on problem-solving techniques. ○ Hands-on: Simulating common operational issues and diagnosing problems in a lab environment.
8: Performance Tuning and Efficiency	<ul style="list-style-type: none"> ○ Topics: Optimizing compressor performance parameters and ensuring equipment runs at peak efficiency. ○ Practical skills: Utilizing performance software to size and optimize compressors.
9: Screw and Rotary Compressor Specifics	<ul style="list-style-type: none"> ○ Topics: Design, operation, and maintenance procedures for rotary screw and other positive-displacement compressors. ○ Hands-on: Operating and performing hands-on checks on a rotary screw compressor, focusing on control systems and lubrication circuits.
10: Centrifugal Compressor Specifics	<ul style="list-style-type: none"> ○ Topics: Theory, operation, and maintenance of large centrifugal compressors. Surge prevention is a major focus. ○ Hands-on: Hands-on activities related to centrifugal equipment and its controls.
11: Advanced Diagnostic and Vibration Analysis	<ul style="list-style-type: none"> ○ Topics: Introduction to vibration monitoring and analysis for detecting and diagnosing faults in rotating equipment. ○ Hands-on: Using vibration analysis tools to monitor and identify potential issues on running equipment.
12: Modernization and Controls	<ul style="list-style-type: none"> ○ Topics: Discussing modernization options and leveraging remote diagnostic services for improving efficiency and reliability. ○ Practical skills: Overview of complex control systems and control loop tuning methods (no independent tuning).
13: Customer Service and Field Protocols	<ul style="list-style-type: none"> ○ Topics: Professional conduct, customer interaction, accurate reporting, and managing parts and tools in the field. ○ Practical skills: Role-playing customer service scenarios and preparing accurate service reports.
14: System Commissioning and Installation	<ul style="list-style-type: none"> ○ Topics: Standard operating procedures for new equipment startups, installation checks, and testing. ○ Hands-on: Conducting simulated system startup and testing procedures, following a manufacturer's manual.
15: Capstone Simulation	<ul style="list-style-type: none"> ○ Topics: Participants will be given a large compressor scenario with a complex issue and a limited parts inventory. ○ Hands-on: Students work in teams to diagnose, troubleshoot, and repair the issue within a given timeframe, presenting their findings and repair process.
16: Final Review and Certification	<ul style="list-style-type: none"> ○ Topics: Comprehensive review of all course material. ○ Assessment: Final written exam