STARK STATE COLLEGE

GENERAL SYLLABUS

Course Information

Course Name: Midsize Unit Compressor Assembly
Course Number: ARL235

Required Materials

Textbook(s): Midsize Unit Copressor Assembly 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 Industrial Compressors	• Classroom: Course introduction, instructor and student introductions, and a review of the course syllabus and safety protocols. • Classroom: Basic principles of compression, history, and applications of compressors in various industries. • Lab: Workshop tour and basic tool identification.
2: Safety and Workshop Procedures	• Classroom: Comprehensive safety training covering lockout/tagout (LOTO), personal protective equipment (PPE), and handling compressed gas. • Lab: Introduction to workshop procedures, including part inventory and documentation. Perform safety inspections on lab equipment.
3: Compressor Types and Applications	• Classroom: Classification of industrial compressors: positive displacement (reciprocating, screw) vs. dynamic (centrifugal). • Classroom: Characteristics and common applications of each compressor type. • Lab: Disassemble small-scale demonstration models of reciprocating and screw compressors to observe basic components.
4: The Compressor Frame and Casing	• Classroom: Study of compressor components: main casing, frame, and crankcase. • Lab: Guided hands-on inspection of midsize compressor frames. Learn about material selection and inspection for defects.
5: Reciprocating Compressor Power Train	• Classroom: In-depth look at crankshafts, connecting rods, crossheads, and pistons. • Lab: Remove and replace power train components on a midsize reciprocating unit.

Week	Chapter/Topic/Lab
6: Reciprocating Compressor Cylinders and Valves	• Classroom: Study of compressor cylinder assemblies, suction and discharge valves, and clearance pockets. • Lab: Service and replace suction and discharge valves. Set piston end clearances.
7: Screw Compressor Rotors	• Classroom: Theory of operation for twin-screw compressors. Focus on rotor profiles and operational dynamics. • Lab: Guided disassembly and reassembly of screw compressor rotors within their housing.
8: Mid-Term Assessment	• Classroom: Comprehensive written exam on all covered theoretical topics. • Lab: Hands-on practical exam. Students will perform disassembly or assembly procedures for specific compressor components.
9: Bearings, Seals, and Lubrication Systems	• Classroom: Study of various bearing types (e.g., sleeve, roller) and sealing arrangements (e.g., dry gas seals). • Classroom: Introduction to lubrication systems: function, components, and oil types. • Lab: Inspect and replace bearings and seals. Learn to check oil pressure and filters during assembly.
10: Instrumentation and Controls	• Classroom: Overview of compressor controls, monitoring systems, sensors, and protective devices. • Classroom: Introduction to control panels and electrical schematics related to midsize units. • Lab: Identify and test various sensors, switches, and valves on a test unit.
11: Auxilary Systems and Piping	• Classroom: Study of coolers (intercoolers and aftercoolers), separators, and filters. • Lab: Assemble and leak-test auxiliary systems, connecting them to the main compressor unit.
12: Complete Compressor Assembly	• Classroom: Review of all assembly stages. Final preparation and checklists before a full assembly process. • Lab: Guided, step-by-step assembly of a complete midsize compressor unit, from frame to final bolt-up.
13: Startup, Commissioning, Testing	• Classroom: Procedures for pre-startup checks, initial startup sequences, and operational parameters. • Lab: Safely perform a controlled startup of the assembled unit and conduct basic performance testing.
14: Troubleshooting and Repair	• Classroom: Systematic troubleshooting techniques for common compressor problems (e.g., vibration, low oil pressure, overheating). • Lab: Diagnose and fix simulated faults on test units. Focus on root cause analysis.
15: Preventive Maintenance and Overhaul	• Classroom: Principles of preventative maintenance, including scheduling, component inspection, and part replacement intervals. • Lab: Perform a simulated overhaul, including disassembly, inspection, cleaning, and replacement of parts.
16: Final Review and Exam	• Classroom: Course review, including a Q&A session. Open discussion with the instructor and peers. • Assessment: Written final exam and a comprehensive hands-on final assembly and testing practical.