

Industrial Troubleshooting (INMT 2345)

Credit: 3 semester credit hours (2 hours lecture, 4 hours lab)



Prerequisite/Co-requisite: CNSE 1371

Course Description

An advanced study of the techniques used in troubleshooting various types of industrial equipment to include mechanical, electrical, hydraulic, and pneumatic systems and their control devices. Emphasis will be placed on the use of schematics and diagrams in conjunction with proper troubleshooting procedures.

Required Textbook and Materials

1. *Audel Mechanics & Millwrights Guide* by Davis & Nelson 5th
2. ISBN number is 0-7645-4171-4

Course Objectives

Upon completion of this course, the student will be able to:

1. Demonstrate a working knowledge of various troubleshooting techniques.(SCANS C1.1; C2.2; C5.2; C6.2; C7.2; C8.1; C11.2 C12.1; C14.3; C15.3; C16.4; C18.5; C19.5; C20.4; F1.5; F2.5; F3.4; F4.4; F5.5; F6.4; F7.4; F8.4; F9.4; F10.3; F11.4; F12.4; F13.4; F14.4; F15.3; F16.4; F17.5)
2. Properly troubleshoot hydraulic, pneumatic, and electrical systems using schematics and diagrams (SCANS C1.2; C2.4; C3.3; C4.3; C5.4; C6.3; C7.3; C8.1; C11.1 C12.2; C13.3; C14.3; C15.4; C16.3; C17.2; C18.3; C19.3; C20.5; F1.5; F2.5; F3.4; F4.4; F5.5; F6.3; F7.4; F8.3; F9.5; F10.3; F11.44X; F12.4; F13.4; F14.4; F15.3; F16.5; F17.5)
3. Troubleshoot mechanical drive systems.(SCANS C1.3; C2.3; C3.5; C4.3; C5.4; C6.4; C7.5; C8.1; C9.3; C10.1; C11.3 C12.3; C13.2; C14.5; C15.5; C16.4; C17.4; C18.5; C19.5; C20.5; F1.5; F2.3; F3.5; F4.5; F5.5; F6.3; F7.3; F8.5; F9.5; F10.3; F11.4; F12.5; F13.5; F14.5; F15.3; F16.5)

SCANS Skills and Competencies

Beginning in the late 1980's, the U.S. Department of Labor Secretary's Commission on Achieving Necessary Skills (SCANS) conducted extensive research and interviews with business owners, union leaders, supervisors, and laborers in a wide variety of work settings to determine what knowledge workers needed in order to perform well on a job. In 1991 the Commission announced its findings in *What Work Requires in Schools*. In its research, the Commission determined that "workplace know-how" consists of two elements: foundation skills and workplace competencies. .

Course Outline

1. Troubleshooting techniques and safety

Approved 06/2010

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- A. Demonstrate the techniques of troubleshooting
 - 1. Test equipment with existing working part
 - 2. Test equipment with new part
 - B. Give examples of safety procedures to be used when troubleshooting Equipment
2. Hydraulics and safety
- A. Demonstrate what Hydraulic forces are
 - 1. Demonstrate force of water
 - 2. Demonstrate force of oil
 - B. Demonstrate the dangers of hydraulics
 - 1. Show film of dangers of hydraulics
3. Pneumatics and safety
- A. Demonstrate what Pneumatic forces are
 - 1. Demonstrate force of air
 - 2. Demonstrate the force of a contained gas
 - B. Demonstrate the dangers of Pneumatics
 - 1. Show film of dangers of Pneumatics
4. Electrical systems and safety
- A. Demonstrate the types of Electrical Systems
 - 1. Demonstrate a 12 volt DC system
 - 2. Demonstrate 120 volt AC system
 - B. Illustrate the dangers in each system
 - 1. Show film of dangers of Electrical systems
5. Electrical schematics
- A. Illustrate and Identify what schematics are
 - 1. Illustrate a 12 volt system schematic
 - 2. Illustrate a 120 volt system schematic
 - B. Demonstrate the use of a schematic
6. Gears and safety
- A. Demonstrate the use of Gears
 - 1. Show the types of gears
 - 2. Demonstrate the use of speed and size in gears
 - B. Demonstrate the dangers of gears in equipment
7. V-belt drives and safety
- A. Demonstrate what V-belt drives are
 - 1. Show example of common V-belt
 - 2. Show example of common V-belt drive
 - B. Examine the dangers of V-Belts
8. Flat belts and safety
- A. Demonstrate what and how Flat belts work
 - 1. Show example of common Flat belt
 - 2. Show example of common Grooved Flat belt
 - 3. Demonstrate how Flat belts work
 - B. Examine the dangers of Flat belts
 - 1. Demonstrate how Flat belts stay in Pulleys

Comment [L1oT1]: This is an objective. Revise to traditional outline format. This outline doesn't demonstrate the scope and depth of a college level course. Expand the outline.

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2. Demonstrate how grooved Flat belts stay in Pulleys
9. Pulleys and safety
 - A. Illustrate what pulleys are and do
 1. Demonstrate a V-Pulley at work
 2. Demonstrate a Flat Pulley at work
 - B. Illustrate the dangers of Pulleys
 1. Illustrate the dangers of closed Pulleys
 2. Illustrate the dangers of common open Pulleys
10. Chain drives and safety
 - A. Illustrate what chain drives are and how they work
 1. Demonstrate the chain drive
 2. Demonstrate how the chain drive operates
 - B. Illustrate what sprocket drives are
 1. Demonstrate the sprocket drive
 2. Demonstrate the operation of the sprocket and chain
11. Couplings and safety
 - A. Illustrate what couplings are and how they are used
 1. Show students a coupling in service
 2. Show students the different types of couplings used in industry
 - B. Give examples of the dangers of using couplings
 1. Show students the dangers of the “Thomas” coupling
 2. Show students the weak points of the “Love Joy” coupling

Grade Scale

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

Course Evaluation

Final grades will be calculated according to the following criteria:

<i>Activity</i>	<i>Percentage</i>
Major test	75%
Class participation	25%
Total	100%

Course Requirements

1. AAS Degree Graduates must pass the WorkKeys Exam during this course for Graduation.
2. AAS Degree Graduates must pass the NCCER Rigging Fundamentals Exam during this course for Graduation.
3. Developing Troubleshooting techniques

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4. Practicing safety and Lock out / tag out
5. Practice the principles of preventive and predictive maintenance

Attendance Policy

1. Missing more than 20% of classes will result in an automatic “F” for the course.
2. Absences are counted for unexcused, excused and coming to class late.
3. Missing more than 20% of a class period will count as an absence.
4. Being tardy 3 times equals 1 absence.

Course Policies

1. No food, drinks, or use of tobacco products in class.
2. No foul or harsh language will be tolerated
3. Turn off all Cell Phones during lectures
4. Headphones may be worn only upon Instructor approval
5. Do not bring children to class.
6. No Cheating of any kind will be tolerated. Students caught cheating or helping someone to cheat can and will be removed from the class for the semester. Cheating can result from expulsion from LIT.
7. If you wish to drop a course, the student is responsible for initiating and completing the drop process. If you stop coming to class and fail to drop the course, you will earn an ‘F’ in the course.
8. Proper Dress It is the student’s responsibility to dress for work in an industrial atmosphere, long pants, shirts with sleeves, substantial footwear (no sandals, flip flops, cloth shoes), safety glasses and hard hats will be required. Students will be required to be clean shaven to be able to achieve a seal in respirators and fresh air packs.
9. Internet Usage
 - a. Classroom computers have access to the internet.
 - b. Student usage of the internet will be monitored.
 - c. Proper usage of the internet will be allowed. Used for classroom research or as directed.
 - d. Any unauthorized use of the internet will not be tolerated.
 - e. Improper usage of the internet, such as profanity, pornography, gambling, etc... will result in disciplinary action not limited to expulsion from LIT.
 - f. Student usage of the internet will be monitored.
 - g. Proper usage of the internet will be allowed. Used for classroom research or as directed.

Disabilities Statement

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The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the office in Student Services, Cecil Beeson Building.

Course Schedule

Week	Topic	Reference
1	Course introduction and policies <ul style="list-style-type: none"> • Lecture • Lab: Practice 	Handouts
2	Introduction to Troubleshooting <ul style="list-style-type: none"> • Lecture • Lab: Practice • Test 1 	Chapter 1
3	The Basic Toolbox <ul style="list-style-type: none"> • Lecture • Lab: Practice 	Chapter 3
4	Using Power Tools <ul style="list-style-type: none"> • Lecture • Lab: Practice • Test 2 	Chapter 4/5
5	Machinery and Equipment Inspection <ul style="list-style-type: none"> • Lecture • Lab: Practice • Test 3 	Chapter 9
6-8	Understanding Bearings <ul style="list-style-type: none"> • Lecture • Lab: Practice • Test 4 	Chapter 10
9/10	Application of Belts <ul style="list-style-type: none"> • Lecture • Lab: Practice • Test 5 	Chapters 13/14
11	Application of Chain Drives <ul style="list-style-type: none"> • Lecture • Lab: Practice • Test 6 	Chapter 15
12	Application of Gears <ul style="list-style-type: none"> • Lecture 	Chapter 16

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- Lab: Practice
 - Test 7

13-16 Troubleshooting Mechanical Drives

- Lecture
- Lab: Practice
- Final Exam

Contact Information:

Instructor: Mr. William C. (Bill) Holton
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Office Hours: 10:30 am -2:30 pm M-F