

SYLLABUS
MENG 3203: Applied Fluid Power Design
{Required Course}
Spring 2023

Instructor: Dr. J. Brink

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Office Hours: MWF: 11-12 pm; TR: 4-5 pm

Course Schedule: Lecture: MW: 10-10.50 am;

Course Schedule: LAB: T: 5-6.50 p.m.; R: 1-2.50 pm; F 1-2.50 pm

Location: Lecture McCoy Hall 136; Lab McCoy Hall 131+135

CATALOG DESCRIPTION:

The fundamentals of fluid mechanics as applied to hydraulic and pneumatic hardware models of pumps, motors, pistons, accumulators, valves and transmission lines. Design and analysis procedures for implementing total fluid power systems with high operating efficiencies and adequate dynamic response. This class has a companion lab.

COURSE PREREQUISITES

MENG 3104 Fluid Mechanics

OTHER PREREQUISITES

Basic computer skills, hand calculator

REQUIRED TEXT BOOKS

- (1). Fluid Power Circuits and Controls – Fundamentals and Applications by Cundiff
- (2). Fluid Power Lab Book 2021*. (* date will be on the cover page – provided on D2L)

TOPICS COVERED

- Chap 1 Overview of Fluid Power
- Chap 2 Fluid Power Basics
- Chap 3 Pressure Control
- Chap 4 Creation and Control of Fluid Flow
- Chap 5 Rotary Actuators
- Chap 7 Linear Actuators
- Chap 8 Temperature and Contamination Control
- Chap 9 Auxiliary Components
- Chap 10 Pneumatics
- Chap 11 Servo and proportional Valves
- Electrical control of fluid power equipment
- A variety of laboratories using hydraulic/ pneumatic equipment.
- The Automation Studio software (CAD lab) will also be used to draw and design hydraulic and pneumatic circuits. This will be followed by simulation.

COURSE LEARNING OBJECTIVES AND RELATIONSHIP TO STUDENT OUTCOMES

	Program Outcomes						
Outcome-Related Course Learning Objectives	1	2	3	4	5	6	7
Student will be able to use the Automation Studio software to draw and design hydraulic and pneumatic circuits	x	x	x			x	
Student will be familiar with commonly used hydraulic and pneumatic components	x						
Student will be able to perform calculations in order to size the components of a hydraulic circuit	x	x					
Student will be able to interpret and sketch hydraulic and pneumatic circuits using ANSI symbols			x				
Student will be able to plumb and wire hydraulic/pneumatic and electrical control circuits						x	
Students will be able to design hardwired electrical logic circuits using Automation Studio for hydraulic and pneumatic circuits		x	x				
Students will be familiar with servo hydraulic circuits and components	x						
Student will be able to collect and interpret data from hydraulic circuits						x	
Students will be able to work in teams in the laboratory					x		
Students will be able to apply safety principles as related to fluid power equipment and in the design of machinery using ethical principles				x			
1: an ability to identify, formulate, and solve complex engineering problems by applying the principles of engineering, science, and mathematics							
2: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental, and economic factors							
3: an ability to communicate effectively with a range of audiences							
4: an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts							
5: an ability function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives							
6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions							
7: an ability to acquire and apply new knowledge as needed, using appropriate learning strategies							

CONTRIBUTION OF COURSE TO PROFESSIONAL COMPONENT

This course contributes to the Engineering Science component of the program.

Prepared by Dr. Jan Brink, Jan 2023

COURSE ORGANIZATION AND ASSESSMENT

- Lecture and Lab Format

This course consists of a two 50-minute lecture sessions per week and one lab session of 110 minutes. You should stay with your assigned lab group all semester long. You will turn in the lab report as a group. Class time will be spent mostly explaining and discussing concepts, and solving relevant problems. Lectures will not be used to communicate the entire course content and thus, you will have to study some of the course material on your own. The lab sessions will nearly always start out with an explanation of theory the first portion of the lab. Your attendance is required from start to finish. **The instructor will setup the lab groups so that you will be working in teams as would be the case later in regular employment.** You cannot switch lab groups once you are assigned into a group. Students will be held responsible on the tests for any information covered in lab. Student participation in class discussions is highly encouraged. You will also be required to **clean the laboratory** equipment and store equipment away neatly in the drawers after wiping the components clean. **You are required to wear safety glasses at all times.** This is done for your own safety since we do not want anybody to get hurt.

- Class Attendance

You are expected to attend class and are responsible for notes, homework assignments, and exams

- Student Attitude

Once class starts, the use of cell phone and/or pager, reading a newspaper, conducting private discussions, using the computer (unless asked by your instructor), working on anything that is not directly related to the course, making derogatory remarks about a classmate or your instructor will not be accepted and may result in your dismissal from the class. You can come see the instructor in his office for any concerns you have regarding the class.

- Late Assignment

Homework assignments must be turned in on the due date, at the beginning of class. Once class starts, no homework will be accepted. Do not ask one of your classmates to turn in an assignment for you. It will not be accepted. You are not allowed to work on homework during the class period. Students work in lab teams. One Lab Report is turned in by the group with all the names of the group. Students should be present at the beginning of the lab period in order to turn in the lab reports. No late lab reports will be accepted

- Exam Make-up

You are expected to take the exams on the scheduled date and time IN CLASS when it is given. However, if for some acceptable reason you are not able to do so, then you must inform the instructor in advance. The instructor will then decide whether you will be allowed to take a make-up exam, depending on the validity of your excuse. No exceptions will be made, unless an official written statement is given by a physician or attorney.

Exam Content

Although most of the exam problems are based on the material covered and have the same degree of difficulty as those assigned for homework or solved in class, some problems may involve concepts not necessarily covered in class.

- **Evaluation Method**

Your performance will be tested regularly throughout the semester by in-class exams, lab reports and several homework assignments. Homework assignments sets will be collected for grading, you are encouraged to submit each and every assignment. Homework and lab reports will only be accepted at the beginning of class, since you cannot work on the homework or old lab reports during class or lab.

- **Course Grade**

The final grade for the course will be based on the exam scores, the average of lab reports, the average of the scores earned in the homework assignments, and the score received for your attitude. The overall average score (X) for the course is determined as follows:

$$X = 0.75 \times \{(\text{exam1} + \text{exam 2} + \text{exam 3})/3\} + 0.10 \times (\text{homework average}) + 0.10 \times (\text{lab reports}) + 0.05 \text{ Attendance/Attitude}$$

Note: a total of only 3 exams are given in this class, this **includes** the final.

The final letter grade for the course is based on the value of X and is determined from the following grade levels: TABLE Grading Ranges and Letter Grades

Value of X (in %)	Letter Grade
90 till 100	A
80 till <90	B
70 till <80	C
60 till <70	D
< 60	F

GENERAL GUIDELINES

- Use a systematic approach to solve problems. If a problem involves drawing a graph, use Excel or any other graphic software tool to draw the graph. In engineering neatness is a must, not a luxury.
- Although you are strongly encouraged to study in group, you must work individually when you solve homework problems otherwise you will not do well on the exams and quizzes.

GENERAL EDUCATION STATEMENT

Students in this course must demonstrate their competency in oral and written communication through written homework assignments and exams, and through solving problems on the board. They must also demonstrate their ability to use the English language.

ACADEMIC INTEGRITY POLICY

Scholastic dishonesty will not be tolerated and will be prosecuted to the fullest extent. You are expected to have read and understood the current issue of the student handbook

regarding student responsibilities & rights, and the intellectual property policy information about procedures and what constitutes acceptable on-campus behavior.

LICENSED HANDGUN HOLDERS

Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's webpage at <http://mwsu.edu/campus-carry/rules-policies>.

DISCLAIMER STATEMENT

Information contained in this syllabus, other than grading, late assignments, makeup work, and attendance policies, may be subject to change with advance notice, as deemed appropriate by the instructor.

CONFLICT RESOLUTION

- a. The student should contact the instructor face to face or via e-mail if there is an issue with the course or the instructor. The faculty and the student will discuss this face to face or via email. Hopefully a resolution is reached on the issue.
- b. The student should notify the faculty via email again if the issue still did not get resolved after the first encounter or communication.
- c. The student can then contact the Chair of the McCoy School of Engineering, Dr. Desai, face to face or via email, (raj.desai@msutexas.edu), and discuss this issue. Dr. Desai will discuss the issue at hand with the faculty member. Dr. Desai will discuss the result of this discussion with the student. Hopefully a resolution is reached on the issue after this.
- d. The student should notify the Chair via email if the issue still did not get resolved.
- e. The Chair will contact the Dean and try to resolve the conflict. In case the conflict deals with the student grade, she will forward the case to the Grade Appeals Committee if necessary.

COVID-19 PROCEDURES & REPORTING

Any student (vaccinated or unvaccinated) who has a laboratory confirmed case of COVID-19 must complete the https://cm.maxient.com/reportingform.php?MSUTexas&layout_id=9 This form will be used to notify campus health professionals and residence life staff (if you reside on campus) and generate ***absence notifications*** to your instructors.

For the most up-to-date information, please refer to the <https://msutexas.edu/coronavirus/index.php> at MSU Texas website.

The **Final Exam** will be IN-CLASS (just like the other exams) on Monday, May 10 2023 from 10.30-12.30 pm