



**COLLEGE OF TECHNOLOGY**  
*First Semester, AY 2021--2022*

**COURSE OUTLINE**

**Course Code** : EET 411

**Teacher:** ROLAN A. SULIMA, PhD TEM

**Course Title** : Electro-pneumatic  
Control

**Class Schedule:**

**Course Credit:** 3 units

**Term** : 1<sup>st</sup> Semester, AY 2021-2022

**Prerequisite** :

**Email Address:** [rsulima2@ssct.edu.ph](mailto:rsulima2@ssct.edu.ph)

**Course Description:**

This course covers the basic of pneumatic, electro pneumatic and hydraulic control circuit in a mechatronic system. Students will learn the function and properties of control elements based upon physical principles, and the roles they play within the system. Technical documentation such as data sheets, circuit diagrams, displacement step diagram and function charts will also be covered. By understanding and performing measurements on the pneumatic and hydraulic control circuits, students will learn and apply troubleshooting strategies to identify, localize and correct malfunctions. Preventive maintenance of (electro) pneumatic and hydraulic components as well as safety issues within the system will be discussed.

**Course Outcomes** : *At the end of the course, students should be able to:*

- Discuss what a mechatronic system is, and the inter-relationship of components and modules within a complex mechatronic system with focus on electro-pneumatic and hydraulic control system.
- Apply the general safety practices in mechatronics and laboratory
- Determine the difference of hydraulic and pneumatic fluid power.
- Identify pneumatic and hydraulic components such as cylinder, directional valves, regulator, flow control valves, pumps and motor.
- Read, analyze and utilize the technical documents such as air flow, data sheets, circuit diagram, displacement step diagrams, timing diagram for electro-pneumatic components within mechatronic system.
- Investigate and document causes of malfunctions in pneumatic circuit base upon the technical documentation.

**Course Requirements:**

1. Major Examinations
2. Quizzes/ Assignments
3. Attendance
4. Performance Task

**Course Content:**

TOPIC NO.	TOPIC TITLES	DURATION (hours)
1	<b>1. Introduction to Fluid Power and Application in Mechatronics System</b> 1.1 Introduction to Fluid Power 1.2 Fluid power system 1.3 System characteristics	



	1.4 Advantages and disadvantages of fluid power system	
2	<b>2. Review of Mechatronics Safety</b> 2.1 Integrate Safety Engineering into Mechatronic Design 2.2 Safety Rules in Mechatronics Laboratories 2.4 Safety Operation of Pneumatic Compressed Air 2.5 Work and safety instructions 2.6 Housekeeping 2.7 Responses to OSH	
3	<b>3. Basic Principles of Hydraulics</b> 3.1 Hydraulic system Introduction and working principles 3.2 Hydraulic System Components and Their Functions 3.2 Application of Hydraulics in the Mechatronics System 3.3 Advantages and Disadvantages of hydraulic system	
4	<b>4. Basic Principle of Pneumatics, Pneumatic Source and Control and Application of Vacuum in the System</b> 4.1 Principles of Pneumatics 4.2 Pneumatic source and control 4.3 Compressed Air Preparation and Distribution 4.4 Types of Compressor 4.5 Methods of Air Drying 4.6 Dimensioning the Pipe 4.7 Basic vacuum technology	
5	<b>5. Pneumatic Components: Cylinder, Motor, Actuator and Valves</b> 5.1 Cylinder, motor, and actuators, Troubleshoot cylinder issue in the system 5.2 Directional control valves, flow control valves and their application in the system 5.3 Pneumatic and Electro-pneumatic Simulation	
	<b>MIDTERM EXAMINATION</b>	1
6	<b>6. Electronic Control for Directional Control Valve Conversion Factor and Application with Cylinders</b>	
7	<b>7. Pressure Control Valves, and Speed Control Application and Troubleshooting</b>	
8	<b>8. Flow Control Valve and Speed control Application and Troubleshooting</b>	
9	<b>9. Review Complete Mechatronic System with Focus on Electro-pneumatic Components</b>	
	<b>FINAL EXAMINATION</b>	1
	<b>TOTAL NUMBER OF HOURS</b>	

## References:

### Ebooks

Yaobao Yin(2019). High Speed Pneumatic Theory and Technology Volume 1: Servo System  
Turner,Ian C.(2020). Engineering Application of Pneumatic and hydraulic  
Amatrol (2017) Basic Pneumatic students Reference  
Parr (2011). Hydraulic and Pneumatic  
Beater(2007)Pneumatic Drives: System Design, Modelling and Control  
Jarostaw Stryczek(2021). Advances in Hydraulic and Pneumatic Drives and Control 2020



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Bishop, Robert H. (2006). Mechatronics: An introduction. CRC Press.  
Cheeseman, J. (2009). Automation, Retrieved on April 2, 2012, from [http://EzineArticles.com/?expert=John\\_Cheesman](http://EzineArticles.com/?expert=John_Cheesman)  
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FESTECH, 706 Darung technotown 5,493, Kasan-Dong, Kumuchun-ku, Seoul, Korea. [festech@festech.co.kr](mailto:festech@festech.co.kr) Homepage: [www.festech.co.kr](http://www.festech.co.kr)  
Festo Didactic GmbH & Co. KG, D-73770 Denkendorf, 1996-2004. [www.festo.com/didactic](http://www.festo.com/didactic), [did@festo.com](mailto:did@festo.com)  
Fraser, C.J., Electrical Machines. The Mechatronics Handbook, CRC Press, 2002.  
Frank Ebel, Jürgen Hasel. (2004).Festo Didactic GmbH & Co. KG, D-73770 Denkendorf [www.festo.com/didactic](http://www.festo.com/didactic), [did@festo.com](mailto:did@festo.com)  
Garton, David. (2011). Vacuum Technology and Vacuum Design Handbook for Accelerator  
Prede G, Scholz D.( 2002). Electro Pneumatics Basic Level, © Copyright by Festo Didactic GmbH & Co., D-73770 Denkendorf

### Course Evaluation:

Criteria	Lecture Grade
➤ Quizzes and online outputs/interaction	25%
➤ Performance Tasks (Projects/Assignments)	35%
➤ Major Examination (Midterm and Final)	40%
<b>TOTAL</b>	<b>100%</b>

Grade Point	Description
1.0	Excellent
1.5 – 1.1	Very Good
2.0 – 1.6	Highly Satisfactory
2.5 – 2.1	Good
2.9 – 2.6	Satisfactory
3.0	Passing
5.0	Failed due to poor performance, absences, withdrawal without notice
DRP	Dropped with approved dropping slip
INC	Incomplete requirements but w/ passing class standing. INC is for non-graduating students only
NG	No Grade

Source: *SSCT Student Handbook*

### Course Policies:

1. Attendance shall be checked in every class session in the Google Meet. This is to monitor the absences incurred by the students in terms of the allowable number of absences for a course as stipulated in the Student Handbook.
2. During online classes, video camera shall be turned on all the time and microphone shall be turned off. The microphone shall be unmuted only if the student's name is called to participate in class discussion.
3. Major examinations in multiple-choice type shall be done online. For problem solving type, detailed solutions shall be written legibly in separate sheets of paper and shall be converted to pdf form prior to submission.



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4. Cheating in major examinations which includes attempts to defraud, deceive, or mislead the instructor in arriving at an honest assessment shall entail zero score.
5. Plagiarism which is a form of cheating that involves presenting the ideas or work of another as one's own work shall entail zero score.
6. Projects shall be submitted on or before the deadline. Non-submission of a project on the deadline shall entail zero score.
7. An INC grade shall be given to students who comply 75% of the course requirements or fail to take the major exams.

*Prepared by:*

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VP for Academic Affairs