

Bachelor of Science in Marine Engineering

INSTRUCTOR'S GUIDE

Course Title:	Basic Control Engineering	Date created:
Course Code:	Auto 1	
Effective Date:		Revision No.: 0
Prepared by: Eng'r Wenceslao M. Cawagas III MEP-MEM	Checked by: C/E Alexander V. Tabobo Dean, College of Marine Engineering	Approved by: Dr. Ronald D. Barro, D. Eng. Asst. Supt. - ATRE

By the end of this course, the students will be able to demonstrate knowledge, understanding and proficiency of the:

CO1: Differentiate basic construction and principles in automation regarding various measuring instruments and automation devices used onboard ships.

CO2: Interpret process and instrument diagrams of automation system based on the industry standards

CO3: Demonstrate performance test in accordance with the manufacturers standards for the: Monitoring systems; Automatic control devices; and Protective devices

WeekNo. Day No.	TIME 3 hrs.lec/ 3 hrs. lab	UNITS/STEPS/AIDS	CONTENTS/ SUMMARY/ ACTIVITY
W1-D1	1.5 hrs	Day 1 General References: <ul style="list-style-type: none"> STCW '78 Table AIII/1 Function: Electrical, Electronic and Control Engineering at the operational level CMO #67 series of 2017: Revised Policies, Standards and Guidelines for BSMT and BS 	The instructor shall introduce the subject to the class: <ul style="list-style-type: none"> Present PPT 1:W1-D1Rationale Motivation; Grading System, Coverage; Discuss about grading system Discuss about the coverageof AUTO 1 Inform about weekly written exam and term exams schedule

		<p>Mar E programs</p> <ul style="list-style-type: none"> CMO#14 series of 2018: Addendum to CMO #67series of 2017 <p>Teaching Aid/s: PPT 1: W1-D1- contents:</p> <ul style="list-style-type: none"> Motivation phase Grading Rationale Lesson proper “<i>Fundamentals of Automatic Control</i>” <p>Textbooks:</p> <ul style="list-style-type: none"> T1: pp1- 10 <p>Video/s:</p> <ul style="list-style-type: none"> Video 1: Automation 6:20 min <p>References:</p> <ul style="list-style-type: none"> SR1: Control Fundamentals pp 9-18 <p>Websites:</p> <ul style="list-style-type: none"> W1: http://www.ent.mrt.ac.lk/~rohan/teaching/EN5001/Reading/DORFCH1.pdf 	<ul style="list-style-type: none"> Motivate the class about impact of automation to the shipping industry and to the world in general Play Video: Automation 6:20 min Draw out class interactions about the video Discuss lesson proper for W1-D1 “Fundamentals of Automatic Control” Entertain questions summarize the lesson of the day <p>The students shall:</p> <ul style="list-style-type: none"> ask questions and interact with discussions.
W1-D2	1.5 hours	<p>Day 2</p> <p>Teaching Aid/s: PPT 2: W1-D2 Component parts of automatic control</p> <p>Video/s:</p> <ul style="list-style-type: none"> Video 2: Basics of Automation 2:09 min <p>Weekly Quiz:</p> <ul style="list-style-type: none"> Q #1 W1-D2 <p>References:</p> <ul style="list-style-type: none"> SR2: Control 101 pp 12-13 <p>Websites:</p> <ul style="list-style-type: none"> W2: http://www.srmuniv.ac.in/sites/default/files/201 	<p>The instructor shall:</p> <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 2:W1-D2 Component parts of automatic control Play video 2: Basics of Automation 2:09 min Discuss about the video. Entertain questions from the students Summarize the day’s lesson Give Q#1W1-D2 <p>Student shall:</p> <ul style="list-style-type: none"> answer the quiz.

		8/Process-Control-Lab.pdf	
W1-D3	3 hours	<p>Day 3</p> <p>Teaching Aid/s:</p> <ul style="list-style-type: none"> Workshop Skills Activity Guide: WSA 01: Block Diagram of an Automatic Control System 	<p>The instructor shall:</p> <ul style="list-style-type: none"> divide students into group, brief the students about the activity, remind the students about safety measures while on the workshop supervise activity proceedings debrief the students after the activity was performed. <p>The student shall:</p> <ul style="list-style-type: none"> read the manual procedure perform the activity. do housekeeping upon conclusion of activity
W2-D1	1.5 hours	<p>Day 1</p> <p>Teaching Aid/s:</p> <p>PPT 3:W2-D1- Control Methodology</p> <p>Video/s:</p> <ul style="list-style-type: none"> Video 3: Feedback Control System 5:56 <p>References:</p> <ul style="list-style-type: none"> SR2: Control 101 pp14-23, p47 <p>Websites:</p> <ul style="list-style-type: none"> W3: http://blog.opticontrols.com/archives/297 	<p>The instructor shall:</p> <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 3:W2-D1:Control Methodology Play video 3: Feedback Control System 5:56 Discuss about the video. Entertain questions from the students Summarize the day's lesson <p>The students shall:</p> <ul style="list-style-type: none"> ask questions and interact with discussions.
W2-D2	1.5 hours	<p>Day 2</p> <p>Teaching Aid/s:</p> <p>PPT 4:W2-D2- "Control Methodology"</p> <p>Video/s:</p> <ul style="list-style-type: none"> Video 3: Feedback Control System 5:56 <p>Weekly Quiz:</p> <ul style="list-style-type: none"> Q#2 W2-D2 <p>References:</p> <ul style="list-style-type: none"> SR2: Control 101 pp14-23, p47 <p>Websites:</p>	<p>The instructor shall:</p> <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 4:W2-D2 contents: Control Methodology Play Video 3: Feedback Control System 5:56 Discuss about the video. Entertain questions from the students Summarize the day's lesson Give Q#2 W2-D2 <p>Student shall:</p> <ul style="list-style-type: none"> answer the quiz

		<ul style="list-style-type: none"> W4: http://www.shippipedial.com/ship-automation-control-system/ 	
W2-D3	3 hours	Day 3 Teaching Aid/s: <ul style="list-style-type: none"> Workshop Skills Activity Guide: WSA 02: Feedback Control System 	The instructor shall: <ul style="list-style-type: none"> brief the students about the activity, what is expected outcome observe safety of the students during the proceedings debrief the students after the activity The student shall: <ul style="list-style-type: none"> read the procedure gather required materials/equipment perform the activity
W3-D1	1.5 hours	Day 1 Teaching Aid/s: PPT 5: W3-D1- On Off control Video/s: <ul style="list-style-type: none"> Video 5: Pressure Switch 3:49 References: <ul style="list-style-type: none"> SR1: Control Fundamentals p32 SR2: Control 101 pp 17-25 Websites: <ul style="list-style-type: none"> W5: https://www.coulton.com/What_is_On_Off_Control.html 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 5: W3-D1: On-Off Control Play video 5: Pressure Switch 3:49 Discuss about the video. Entertain questions from the students Summarize the day's lesson The students shall: <ul style="list-style-type: none"> ask questions and interact with discussions.
W3-D2	1.5 hours	Day 2 Teaching Aid/s: A6:W3-D2- " <i>On-Off Control</i> " Video/s: <ul style="list-style-type: none"> Video 6: How to Adjust a Pressure Switch 7:57 Video 7: Hydrophore Unit 1:22 Weekly Quiz: <ul style="list-style-type: none"> Q#3 W3-D2 References: <ul style="list-style-type: none"> SR2: Control 101 p18 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present A6:W3-D2 contents: On-Off Control Play Video 6: How to Adjust a Pressure Switch 7:57 Discuss about the video. Play Video 7: Hydrophore Unit 1:22 Discuss about the video. Entertain questions from the students Summarize the day's lesson Give Q#3 W3-D2 Student shall: <ul style="list-style-type: none"> Do the seatwork:

			Design an ON OFF Control system using a pressure switch with a cut in pressure of 4 bars and a cut out pressure of 5 bars <ul style="list-style-type: none"> ▪ answer the quiz
W3-D3	3 hours	Day 3 Teaching Aid/s: <ul style="list-style-type: none"> ▪ Workshop Skills Activity Guide ▪ WSA 03: On-Off Control 	The instructor shall: <ul style="list-style-type: none"> ▪ brief the students about the activity, what is expected outcome ▪ observe safety of the students during the proceedings ▪ debrief the students after the activity The student shall: <ul style="list-style-type: none"> ▪ read the procedure ▪ gather required materials/equipment ▪ perform the activity
W4-D1	1.5 hours	Day 1 Teaching Aid/s: <ul style="list-style-type: none"> ▪ PPT 7: W4-D1 “<i>Sequential Control</i>” Video/s: <ul style="list-style-type: none"> ▪ Video 8: Sequential Control of 3 motors 1:59 Manuals: <ul style="list-style-type: none"> ▪ M1: Machinery Operating Manual “HFS” pp10-21 References: <ul style="list-style-type: none"> ▪ R2: Control 101 pp14-23, p47 Websites: <ul style="list-style-type: none"> ▪ W6: https://motor-control-circuits.blogspot.com/2015/03/sequential-control-3-stages.html 	The instructor shall: <ul style="list-style-type: none"> ▪ recall previous topic to the class ▪ discuss lesson proper for the day. ▪ Present PPT 7: W4-D1: Sequential Control ▪ Play video 8: Sequential Control of 3 motors 1:59 ▪ Discuss about the video. ▪ Entertain questions from the students ▪ Summarize the day’s lesson ▪ Remind about the prelim exam the following day ▪ Inform the students about the coverage of the exam The students shall: <ul style="list-style-type: none"> ▪ ask questions and interact with discussions. ▪ Study for the incoming prelim examination
W4-D2	1.5 hours	Day 2 Prelim Examination: <ul style="list-style-type: none"> ▪ Test Questionnaire 	The instructor shall: <ul style="list-style-type: none"> ▪ prepare examination venue ▪ facilitate the conduct of the term exam The student shall: <ul style="list-style-type: none"> ▪ answer Prelim Exam ▪ provide feedback to instructor for their learning progress of the course.
W4-D3	3 hours	Day 3 Teaching Aid/s:	The instructor shall: <ul style="list-style-type: none"> ▪ brief about safety precautions and discuss about the objectives of the activity

		<ul style="list-style-type: none"> WSA 04: Sequential Control 	The student shall: <ul style="list-style-type: none"> read the instructions on the manual perform the activity do housekeeping when the activity is concluded
W5-D1	1.5 hours	Day 1 Teaching Aid/s: <ul style="list-style-type: none"> PPT 8:W5-D1- PID Control Video/s: <ul style="list-style-type: none"> Video 9: What is a PID Controller 5:38 References: <ul style="list-style-type: none"> SR2: pp26-35 Websites: <ul style="list-style-type: none"> W7: https://www.dataforth.com/introduction-to-pid-control.aspx 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 8: W5-D1: PID Control Play video 8: Sequential Control of 3 motors 1:59 Discuss about the video. Entertain questions from the students Summarize the day's lesson Remind students to study for weekly quiz The students shall: <ul style="list-style-type: none"> ask questions and interact with discussions.
W5-D2	1.5 hours	Day 2 Teaching Aid/s: <ul style="list-style-type: none"> PPT 9:W5-D2- "PLC and PID Controller" Video/s: Video 10: Proportional Gain 3:55 Weekly Quiz: <ul style="list-style-type: none"> Q#4 W5-D2 References: <ul style="list-style-type: none"> R2: Control 101 pp14-23, p47 Websites: <ul style="list-style-type: none"> W8: https://www.eurotherm.com/plc-or-pid-controller-whats-the-difference-and-how-do-you-decide-what-technology-you-need 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 9:W5-D2: PLC and PID Controller Play Video 10: Proportional Gain 3:55 Discuss about the video. Entertain questions from the students Summarize the day's lesson Give Q#4 W5-D2 Student shall: <ul style="list-style-type: none"> answer the quiz
W5-D3	3 hours	Day 3 Teaching Aid/s:	The instructor shall: <ul style="list-style-type: none"> brief the students about the expected outcome of the

		<ul style="list-style-type: none"> WSA 05: Performance Check of a PID Controller <p>Simulator:</p> <ul style="list-style-type: none"> S2: PID Simulator 	<ul style="list-style-type: none"> activity remind safety matters answer questions about the activity debrief the students and appreciate those who performed well <p>The student shall:</p> <ul style="list-style-type: none"> read the procedure in the manual perform the activity
W6-D1	1.5 hours	<p>Day 1</p> <p>Teaching Aid/s:</p> <ul style="list-style-type: none"> PPT 10:W6-D1 “Characteristics of PID Control” <p>Video/s:</p> <ul style="list-style-type: none"> Video 11: PIDs Simplified 13:06 <p>References:</p> <ul style="list-style-type: none"> SR2: pp 29-32 	<p>The instructor shall:</p> <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 10: W6-D1: Characteristics of PID Control Play video 11: PIDs Simplified 13:06 Discuss about the video. Entertain questions from the students Summarize the day’s lesson Remind students to study for weekly quiz <p>The students shall:</p> <ul style="list-style-type: none"> ask questions and interact with discussions
W6-D2	1.5 hours	<p>Day 2</p> <p>Teaching Aid/s:</p> <p>A11: W6-D2 “PID Controller Actions”</p> <p>Video/s:</p> <ul style="list-style-type: none"> Video 12: Understanding PID in 4 Minutes 3:59 <p>Weekly Quiz:</p> <ul style="list-style-type: none"> Q#5 W6-D2 	<p>The instructor shall:</p> <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present A11:W6-D2: PID Controller Actions Play Video 12: Understanding PID in 4 Minutes 3:59 Discuss about the video. Entertain questions from the students Summarize the day’s lesson Give Q#5 W6-D2 <p>Student shall:</p> <ul style="list-style-type: none"> answer the quiz
W6-D3	3 hours	<p>Day 3</p> <p>Teaching Aid/s:</p> <ul style="list-style-type: none"> WSA 06: Controller Tuning <p>Simulator:</p>	<p>The instructor shall:</p> <ul style="list-style-type: none"> Brief the students about what is expected in the activity Familiarize them with the use of the PID simulator Demonstrate operation of the simulator <p>The students shall:</p>

		<ul style="list-style-type: none"> ▪ S2: PID Simulator 	<ul style="list-style-type: none"> ▪ Read the manual procedure ▪ perform the activity ▪ draw out realization on the PID tuning
W7-D1	1.5 hours	<p>Day 1</p> <p>Teaching Aid/s:</p> <ul style="list-style-type: none"> ▪ PPT 12:W7-D1 “Temperature Measurement” <p>Video/s:</p> <ul style="list-style-type: none"> ▪ Video 13: How Bi-metallic Thermometer Work 6:20 <p>Textbook/s:</p> <ul style="list-style-type: none"> ▪ T1: pp11-12 	<p>The instructor shall:</p> <ul style="list-style-type: none"> ▪ recall previous topic to the class ▪ discuss lesson proper for the day. ▪ Present PPT 12: W7-D1: Temperature Measurement ▪ Play video 13: How Bi-metallic Thermometer Work 6:20 ▪ Discuss about the video. ▪ Entertain questions from the students ▪ Summarize the day’s lesson ▪ Remind students to study for weekly quiz <p>The students shall:</p> <ul style="list-style-type: none"> ▪ ask questions and interact with discussions
W7-D2	1.5 hours	<p>Teaching Aid/s:</p> <ul style="list-style-type: none"> ▪ PPT 13: W7-D2 “Mechanical Thermometers” <p>Video/s:</p> <ul style="list-style-type: none"> ▪ Video 14: How a Bulb Thermometer Works 4:05 <p>Weekly Quiz:</p> <ul style="list-style-type: none"> ▪ Q#6 W7-D2 	<p>The instructor shall:</p> <ul style="list-style-type: none"> ▪ recall previous topic to the class ▪ discuss lesson proper for the day. ▪ Present PPT 13:W7-D2: Mechanical Thermometers ▪ Play Video 14: How a Bulb Thermometer Works 4:05 ▪ Discuss about the video. ▪ Entertain questions from the students ▪ Summarize the day’s lesson ▪ Give Q#6 W7-D2 <p>Student shall:</p> <ul style="list-style-type: none"> ▪ answer the quiz
W7-D3	3 hours	<p>Day 3</p> <p>Teaching Aid/s:</p> <ul style="list-style-type: none"> ▪ WSA 07: Performance Test of a Pt100 Sensor ▪ WSA 08: Calibration of a Pt100 Transmitter <p>Manual:</p> <ul style="list-style-type: none"> ▪ M3: Pt100 Resistance Table ▪ M8: Fluke 724 Manual 	<p>The instructor shall:</p> <ul style="list-style-type: none"> ▪ brief the students about the expected outcome of the activity ▪ remind safety measures ▪ debrief the students about their results ▪ reconcile different issues about the result <p>The students shall:</p> <ul style="list-style-type: none"> ▪ read the manual procedure ▪ perform the activity 07 and 08 ▪ observe safety practice at all times ▪ do the housekeeping after the activity is concluded

W8-D1	1.5 hours	Day 1 Teaching Aid/s: <ul style="list-style-type: none"> PPT 14: W8-D1 “Electrical Thermometers” Video/s: <ul style="list-style-type: none"> Video 15: Types of Temperature Sensors 4:27 Textbook/s: <ul style="list-style-type: none"> T1: pp13-21 Websites: <ul style="list-style-type: none"> W9: http://www.instrumentationtoday.com/optical-pyrometer/2011/08/ 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 14: W8-D1: Temperature Measurement Play video 15: Types of Temperature Sensors 4:27 Discuss about the video. Entertain questions from the students Summarize the day’s lesson Remind students to study for the midterm exam The students shall: <ul style="list-style-type: none"> ask questions and interact with discussions
W8-D2	1.5 hours	Day 2 Teaching Aid/s: <ul style="list-style-type: none"> Test Questionnaire Midterm Exam 	The instructor shall: <ul style="list-style-type: none"> prepare examination venue facilitate the conduct of the term exam The student shall: <ul style="list-style-type: none"> provide feedback to instructor for the learning progress of the course. answer Midterm Exam
W8-D3	3 hours	Day 3 Teaching Aid/s: <ul style="list-style-type: none"> WSA 09: Performance Test of a TC “K” sensor WSA 10: Calibration of a TC” K” Transmitter Manual: <ul style="list-style-type: none"> M4: Type K thermocouple reference table M8: Fluke 724 Manual 	The instructor shall: <ul style="list-style-type: none"> Brief the student about the activity Remind the students about safety practice Reconcile any arguments about the result of the activity Appreciate those students who are outstanding in their result The student shall: <ul style="list-style-type: none"> Read the manual procedure Perform Activity Do housekeeping upon conclusion of the activity
W9-D1	1.5 hours	Day 1 Teaching Aid/s: <ul style="list-style-type: none"> PPT 15: W9-D1 “Pressure Measurement” Video/s: <ul style="list-style-type: none"> Video 16: How Fluid Pressure is measured 11:10 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 15: W9-D1: “Pressure Measurement” Play video 16: How Fluid Pressure is Measured 11:10 Discuss about the video. Entertain questions from the students Summarize the day’s lesson

		Textbook/s: <ul style="list-style-type: none"> T1: pp23-32 Websites: <ul style="list-style-type: none"> W10: https://en.wikipedia.org/wiki/Pressure_measurement 	<ul style="list-style-type: none"> Remind students to study for weekly quiz The students shall: <ul style="list-style-type: none"> ask questions and interact with discussions
W9-D2	1.5 hours	Day 2 Teaching Aid/s: <ul style="list-style-type: none"> PPT 16: W9-2 “Bourdon Tubes” Video/s: <ul style="list-style-type: none"> Video 17: How a Bourdon Pressure Gauge Work 7:33 Weekly Quiz: <ul style="list-style-type: none"> #7 W9-D2 Websites: <ul style="list-style-type: none"> W11: https://blog.beamex.com/how-to-calibrate-pressure-gauges 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 16:W9-D2: Bourdon Tubes Play Video 17: How a Bourdon Pressure Gauge Work 7:33 Discuss about the video. Entertain questions from the students Summarize the day’s lesson Give Q #7 W9-D2 Student shall: <ul style="list-style-type: none"> answer the quiz
W9-D3	3 hours	Day 3 Teaching Aid/s: <ul style="list-style-type: none"> WSA 11 Performance Test of a Pressure Switch M5: RT116 Nomogram 	The instructor shall: <ul style="list-style-type: none"> Brief the students about the intended outcome of the activity Remind safety measures Debrief by explaining about the outcome of the activity Appreciate those group who are outstanding in performance The student shall: <ul style="list-style-type: none"> Read the instruction manual Ask clarificatory questions perform the activity do housekeeping after the conclusion of the activity
W10-D1	1.5 hours	Day 1 Teaching Aid/s: <ul style="list-style-type: none"> PPT 17 W10-D1 Level Measurement- Direct Video/s: <ul style="list-style-type: none"> Video 18: Ball Float Liquid Level Sensor 4:20 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 17: W10-D1: Level Measurement- Direct Play video 18: Ball Float Liquid Level Sensor 4:20 Discuss about the video.

		Textbook/s: <ul style="list-style-type: none"> T1: pp. 33-34 Websites: <ul style="list-style-type: none"> W12: http://aboutinstrumentation.blogspot.com/2012/02/level-measurement-direct-methods.html 	<ul style="list-style-type: none"> Entertain questions from the students Summarize the day's lesson Remind students to study for weekly quiz The students shall: <ul style="list-style-type: none"> ask questions and interact with discussions
W10-D2	1.5 hours	Day 2 Teaching Aid/s: <ul style="list-style-type: none"> PPT 18: W10-D2 "Level Measurement-Inferential" Video/s: <ul style="list-style-type: none"> Video 19: Level measurement using DP Transmitter 6:14 Weekly Quiz: <ul style="list-style-type: none"> Q#8 W10-D2 Textbook/s: <ul style="list-style-type: none"> T1: pp 35-39 Websites: <ul style="list-style-type: none"> W13: https://paktechpoint.com/indirect-level-measurement-methods-paktechpoint/ 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 18:W10-D2: Level Measurement-Inferential Play Video 19: Level measurement using DP Transmitter 6:14 Discuss about the video. Entertain questions from the students Summarize the day's lesson Give Q#8 W10-D2 Student shall: <ul style="list-style-type: none"> answer the quiz
W10-D3	3 hours	Day 3 Teaching Aid/s: <ul style="list-style-type: none"> WSA12: Performance test of a Float Switch 	The instructor shall: <ul style="list-style-type: none"> Brief the student about the activity Remind safety practice Process the results of the activity The student shall: <ul style="list-style-type: none"> Read the manual procedure Clarify unclear instructions perform activity

			<ul style="list-style-type: none"> do housekeeping at the end of activity
W11-D1	1.5 hours	<p>Day 1</p> <p>Teaching Aid/s:</p> <ul style="list-style-type: none"> PPT 19: W11-D1 “Flow Measurement” <p>Video/s:</p> <ul style="list-style-type: none"> Video 20: Differential Pressure Flow Measurement (Venturi) 4:49 Video 21: DP Flow measurement (Pitot) 4:36 <p>Textbook/s:</p> <ul style="list-style-type: none"> T1: pp41-47 <p>Websites:</p> <ul style="list-style-type: none"> W14: https://en.wikipedia.org/wiki/Flow_measurement 	<p>The instructor shall:</p> <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 19: W11-D1: Flow Measurement Play Video 20: Differential Pressure Flow Measurement (Venturi) 4:49 Discuss about the video. Video 21: DP Flow measurement (Pitot) 4:36 Discuss about the video. Entertain questions from the students Summarize the day’s lesson Remind students to study for weekly quiz <p>The students shall:</p> <ul style="list-style-type: none"> ask questions and interact with discussions
W11-D2	1.5 hours	<p>Day 2</p> <p>Teaching Aid/s:</p> <ul style="list-style-type: none"> PPT 20: W11-D2 “Flow Measurement contd.” <p>Video/s:</p> <ul style="list-style-type: none"> Video 22: Rotameter Working Principle 3:24 <p>Weekly Quiz:</p> <ul style="list-style-type: none"> Q#9 W11-D2 <p>Textbook/s:</p> <ul style="list-style-type: none"> T1: p47-54 <p>Websites:</p> <ul style="list-style-type: none"> W15: https://en.wikipedia.org/wiki/Rotameter 	<p>The instructor shall:</p> <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 20:W11-D2: Flow Measurement contd. Play Video 22: Rotameter Working Principle 3:24 Discuss about the video. Entertain questions from the students Summarize the day’s lesson Give Q#9 W11-D2 <p>Student shall:</p> <ul style="list-style-type: none"> answer the quiz
W11-D3	3 hours	<p>Day 3</p> <p>Teaching Aid/s:</p> <ul style="list-style-type: none"> WSA 13: Performance Test of a DP Transmitter 	<p>The instructor shall:</p> <ul style="list-style-type: none"> brief the students about the activity and its expected outcome remind safety precautions to themselves and to the equipment

		Manual: <ul style="list-style-type: none"> M7: 1151 Rosemount Pressure Transmitter 	<ul style="list-style-type: none"> debrief the students after the conduction of activity and clarify the results The student shall: <ul style="list-style-type: none"> Read the manual procedure perform the activity observe safety at all times
W12-D1	1.5 hours	Day 1 Teaching Aid/s: <ul style="list-style-type: none"> PPT 21: W12-D1 “General Measurement of Process” Video/s: <ul style="list-style-type: none"> Video 23: Inductive Type RPM sensor 5:39 Textbook/s: <ul style="list-style-type: none"> T1: pp 55-59 Websites: <ul style="list-style-type: none"> W16: https://www.marineinsight.com/main-engine/how-to-prevent-crankcase-explosion-on-a-ship/ 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 21: W12-D1: “General Measurement of Process” Play Video 23: Inductive Type RPM sensor 5:39 Discuss about the video. Entertain questions from the students Summarize the day’s lesson Remind students to study for weekly quiz The students shall: <ul style="list-style-type: none"> ask questions and interact with discussions
W12-D2	1.5 hours	Day 2 Teaching Aid/s: <ul style="list-style-type: none"> Semi Final Examination 	The instructor shall: <ul style="list-style-type: none"> prepare examination venue facilitate the conduct of the term exam The student shall: <ul style="list-style-type: none"> provide feedback to instructor for the learning progress of the course answer Semi-final Exam
W12-D3	3 hours	Day 3 Teaching Aid/s: <ul style="list-style-type: none"> WSA 14: Boiler Flame Scanner (Photocell) 	The instructor shall: <ul style="list-style-type: none"> Brief the students about the activity Remind safety precaution Debrief the students after the activity The student shall <ul style="list-style-type: none"> Read the manual procedure perform the activity do housekeeping upon conclusion of the activity
W13-D1	1.5 hours	Day 1	The instructor shall:

		Teaching Aid/s: <ul style="list-style-type: none"> PPT 22: W13-D1 General Measurement of Process contd. Video/s: <ul style="list-style-type: none"> Video 24: Vibration Monitor 16:27 Textbook/s: <ul style="list-style-type: none"> T1: pp 60-74 	<ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 22: W13-D1: General Measurement of Process contd. Play Video 24: Vibration Monitor 16:27 Discuss about the video. Entertain questions from the students Summarize the day's lesson Remind students to study for weekly quiz The students shall: <ul style="list-style-type: none"> ask questions and interact with discussions
W13-D2	1.5 hours	Day 2 Teaching Aid/s: <ul style="list-style-type: none"> PPT 23: W13-D2 Transmitters Video/s: <ul style="list-style-type: none"> Video 25: Open tank Level Measurement 17:29 Video 26: Why 4 to 20 mA 3:38 Weekly Quiz: <ul style="list-style-type: none"> Q#10 W13-D2 References: <ul style="list-style-type: none"> SR2:Control101 pp 4-7 Websites: <ul style="list-style-type: none"> W17:https://www.instrumentationtoolbox.com/2013/06/transmitters-used-in-process.html 	The instructor shall: <ul style="list-style-type: none"> recall previous topic to the class discuss lesson proper for the day. Present PPT 23:W13-D2: Transmitters Play Video 25: Open tank Level Measurement 17:29 Discuss about the video. Play Video 26: Why 4 to 20 mA 3:38 Discuss about the video. Entertain questions from the students Summarize the day's lesson Give Q#10 W13-D2 Student shall: <ul style="list-style-type: none"> answer the quiz
W13-D3	3 hours	Day 3 Teaching Aid/s: <ul style="list-style-type: none"> WSA 15: Performance test of a Pneumatic transmitter Manual: <ul style="list-style-type: none"> M6: Nomogram of Foxboro 11GM 	The instructor shall: <ul style="list-style-type: none"> Brief the students about the activity Emphasize care for the pneumatic transmitter's delicate components Remind safety protocols while at the laboratory Summarize the entire activity based from their gathered data The student shall:

			<ul style="list-style-type: none"> ▪ Read manual procedure ▪ Prepare for equipment needed ▪ perform the activity ▪ do housekeeping upon conclusion of the activity
W14-D1	1.5 hours	Day 1 Teaching Aid/s: PPT 24: W14-D1 Pneumatic Controlling Elements Video/s: <ul style="list-style-type: none"> ▪ Video 27: 3 Basic Mechanism for Pneumatic 4:40 Textbook/s: <ul style="list-style-type: none"> ▪ T1: pp 76-78 	The instructor shall: <ul style="list-style-type: none"> ▪ recall previous topic to the class ▪ discuss lesson proper for the day. ▪ Present PPT 24: W14-D1: General Measurement of Process contd. ▪ Play Video 27: 3 Basic Mechanism for Pneumatic 4:40 ▪ Discuss about the video. ▪ Entertain questions from the students ▪ Summarize the day's lesson ▪ Remind students to study for weekly quiz The students shall: <ul style="list-style-type: none"> ▪ ask questions and interact with discussions
W14-D2	1.5 hours	Day 2 Teaching Aid/s: <ul style="list-style-type: none"> ▪ PPT 25: W14-D2 Receivers Video/s: <ul style="list-style-type: none"> ▪ Video 28: How Servomotors Work 2:27 Weekly Quiz: <ul style="list-style-type: none"> ▪ Q#11 W14-D2 Textbook/s: <ul style="list-style-type: none"> ▪ T1: pp 84-88 Websites: <ul style="list-style-type: none"> ▪ W18: https://en.wikipedia.org/wiki/Chart_recorder 	The instructor shall: <ul style="list-style-type: none"> ▪ recall previous topic to the class ▪ discuss lesson proper for the day. ▪ Present PPT 25:W14-D2: Receivers ▪ Play Video 28: How Servomotors Work 2:27 ▪ Discuss about the video. ▪ Entertain questions from the students ▪ Summarize the day's lesson ▪ Give Q #11 W14-D2 Student shall: <ul style="list-style-type: none"> ▪ answer the quiz
W14-D3	3 hours	Day 3 Teaching Aid/s: <ul style="list-style-type: none"> ▪ WSA 16: AC and DC Servomotors 	The instructor shall: <ul style="list-style-type: none"> ▪ Brief the students about the expected outcome of the activity ▪ Debrief the students after the activity The student shall:

			<ul style="list-style-type: none"> ▪ Read the manual procedure ▪ perform activity ▪ do housekeeping upon conclusion of the activity
W15-D1	1.5 hours	<p>Day 1</p> <p>Teaching Aid/s:</p> <ul style="list-style-type: none"> ▪ PPT 26: W15-D1 Pneumatic Manipulating Element <p>Video/s:</p> <ul style="list-style-type: none"> ▪ Video 29: Control Valves 1:41 ▪ Video 30: How Diaphragm Control valve works 5:28 <p>Textbook/s:</p> <ul style="list-style-type: none"> ▪ T1: pp 115-118 <p>Websites:</p> <ul style="list-style-type: none"> ▪ W19: https://en.wikipedia.org/wiki/Pneumatic_actuator 	<p>The instructor shall:</p> <ul style="list-style-type: none"> ▪ recall previous topic to the class ▪ discuss lesson proper for the day. ▪ Present PPT 26: W15-D1: General Measurement of Process contd. ▪ Play Video 29: Control Valves 1:41 ▪ Discuss about the video. ▪ Play Video 30: How Diaphragm Control valve works 5:28 ▪ Discuss about the video. ▪ Entertain questions from the students ▪ Summarize the day's lesson ▪ Remind students to study for weekly quiz <p>The students shall:</p> <ul style="list-style-type: none"> ▪ ask questions and interact with discussions
W15-D2	1.5 hours	<p>Day 2</p> <p>Teaching Aid/s:</p> <ul style="list-style-type: none"> ▪ PPT 27: W15-D2 Valve Positioner <p>Video/s:</p> <ul style="list-style-type: none"> ▪ Video 31: What are valve positioners 3:41 ▪ Video 32: Calibration of a Positioner 11:28 <p>Weekly Quiz:</p> <ul style="list-style-type: none"> ▪ Q #12 W15-D2 <p>Textbook/s:</p> <ul style="list-style-type: none"> ▪ T1: pp 117-120 	<p>The instructor shall:</p> <ul style="list-style-type: none"> ▪ recall previous topic to the class ▪ discuss lesson proper for the day. ▪ Present PPT 27:W15-D2: Valve Positioner ▪ Play Video 31: What are valve positioners 3:41 ▪ Discuss about the video ▪ Play Video 32: Calibration of a Positioner 11:28 ▪ Discuss about the video. ▪ Entertain questions from the students ▪ Summarize the day's lesson ▪ Give Q #12 W15-D2 <p>The Student shall:</p> <ul style="list-style-type: none"> ▪ answer the quiz
W15-D3	3 hours	<p>Day 3</p> <p>Teaching Aid/s:</p> <p>WSA 17: Diaphragm Operated Control Valve</p>	<p>The instructor shall:</p> <ul style="list-style-type: none"> ▪ Brief the students about the expected outcome of the activity ▪ Debrief the students after the activity <p>The student shall:</p>

			<ul style="list-style-type: none"> ▪ Read the manual procedure ▪ perform activity ▪ do housekeeping upon conclusion of the activity
W16-D1	1.5 hours	Day 1 Teaching Aid/s: <ul style="list-style-type: none"> ▪ PPT 28: W16-D1 Electrical Servomotors Video/s: <ul style="list-style-type: none"> ▪ Video 33: Swash Plate Pump 5:27 Textbook/s: <ul style="list-style-type: none"> ▪ T1: pp121-126 Websites: <ul style="list-style-type: none"> ▪ W20: https://www.watelectrical.com/servo-motor-types-and-working-principle/ 	The instructor shall: <ul style="list-style-type: none"> ▪ recall previous topic to the class ▪ discuss lesson proper for the day. ▪ Present PPT 28: W16-D1: Electrical Servomotors ▪ Play Video 33: Swash Plate Pump 5:27 ▪ Discuss about the video. ▪ Entertain questions from the students ▪ Summarize the day's lesson ▪ Remind students to study for final exam The students shall: <ul style="list-style-type: none"> ▪ ask questions and interact with discussions
W16-D2	1.5 hours	Day 2 Teaching Aid/s: <ul style="list-style-type: none"> ▪ Final Examination Questionnaire 	The instructor shall: <ul style="list-style-type: none"> ▪ prepare the room for examination ▪ facilitate the conduct of the Final Examination The student shall: <ul style="list-style-type: none"> ▪ answer the Written Final Examination ▪ provide feedback to instructor for the learning progress of the course
W16-D3	3 hours	Day 3 Teaching Aid/s: <ul style="list-style-type: none"> ▪ WSA 18 Compilation of WSA ▪ Final Practical Assessment #1 for set A ▪ Final Practical Assessment #2 for set B 	The instructor shall: <ul style="list-style-type: none"> ▪ Collect compilation of activities ▪ Summarize the entire subject of automation what did they learn and the essence of automation in their future work ▪ Prepare for Final Practical Assessment ▪ Brief the students about the rules of the assessment ▪ Conduct Individual Final Practical Assessment
			END