

1	Students can explain the history of the development of control systems, PLC hardware, software, PLC configuration	<ol style="list-style-type: none"> 1.Explore examples of control systems 2.Understand the definition and concept of open and closed loop systems. 3.Identify PLC software 		Lectures, discussions and questions and answers 3 X 50			0%
2	Students can show and explain the function of the PLC I/O system	Identify PLC I/O and its functions		Lectures, discussions, exercises 3 X 50			0%
3	Students are able to understand and practice the basic instructions LD, AND, OR, OUT and END with mnemonic codes using Programming Cosole	<ol style="list-style-type: none"> 1.Can use basic instructions in creating programs 2.Ladder-based program creation and mnemonic codes 		Lectures, discussions, questions and answers, exercises and assignments 3 X 50			0%
4	Can run example programs and create simple programs using basic instructions via the console or ladder simulator	Create programs using the programming console		Lectures, discussions, questions and answers, and 3 X 50 exercises			0%
5	Can run example programs and create simple programs using basic instructions via the console or ladder simulator	Create programs using the programming console		Lectures, discussions, questions and answers, and 3 X 50 exercises			0%
6	Can run example programs and simplify series-parallel programs using basic instructions via the console.	<ol style="list-style-type: none"> 1.Create a series ladder diagram 2.Create a parallel ladder diagram 3.Create a mixed ladder diagram 		Lectures, discussions, questions and answers, and 3 X 50 exercises			0%
7	Can run example programs and simplify series-parallel programs using basic instructions via the console.	<ol style="list-style-type: none"> 1.Create a series ladder diagram 2.Create a parallel ladder diagram 3.Create a mixed ladder diagram 		Lectures, discussions, questions and answers, and 3 X 50 exercises			0%

8	Understand basic instructions, ladder diagrams, and mnemonic codes, as well as create programs with the programming console	<ol style="list-style-type: none"> 1.Explain the basic instructions LD, AND, AND NOT, OR, OR NOT, TIM, CNT, AND LD, OR LD, and OUT using Ladder Diagrams and Mnemonic Code as the basis for PLC programming. 2.Assembling PLC with PC. 3.Open password input on PC. 4.Clearing memory on PC. 5.Create and insert programs on a PC. 6.Make a PLC program to turn on the lights with a switch in a simulated manner. 		Lectures, discussions, questions and answers, exercises and assignments 3 X 50			0%
9	Understand basic instructions, ladder diagrams, and mnemonic codes, as well as create programs with the programming console	<ol style="list-style-type: none"> 1.Explain the basic instructions LD, AND, AND NOT, OR, OR NOT, TIM, CNT, AND LD, OR LD, and OUT using Ladder Diagrams and Mnemonic Code as the basis for PLC programming. 2.Assembling PLC with PC. 3.Open password input on PC. 4.Clearing memory on PC. 5.Create and insert programs on a PC. 6.Make a PLC program to turn on the lights with a switch in a simulated manner. 		Lectures, discussions, questions and answers, exercises and assignments 3 X 50			0%

10	Create a PLC program with timers and counters	1.Create programs using timers and counters. 2.Make a PLC program to turn on 2 lights with a pushbutton in a simulated manner.		Lectures, discussions, questions and answers, exercises and assignments 3 X 50			0%
11	Implementation of a ladder diagram program into CX-Programmer	1.Can use and operate CX-Programmer 2.Can apply basic instructions to CX-Programmer		lectures, discussions and simulations 3 X 50			0%
12	Create an application circuit using a PLC to turn on the lights	Can assemble a PLC with a plant in the form of a lamp. Can create a program to turn on the lights using a timer and counter. Apply the program using the Programming Console and Cx-Programmer		Discussion and practicum 3 X 50			0%
13	Create an application circuit using a PLC to turn on the lights	Can assemble a PLC with a plant in the form of a lamp. Can create a program to turn on the lights using a timer and counter. Apply the program using the Programming Console and Cx-Programmer		Discussion and practicum 3 X 50			0%
14	Can apply DIFU and DIFD instructions	Simulating DIFU and DIFD in Cx-Programmer		Discussion and simulation 3 X 50			0%
15	Automatic bell and conveyor simulation using CX-programmer	1.Able to create an automatic bell program in a simulation using Cx-programmer 2.Able to create conveyor programs in simulation using Cx-programmer		Discussion and simulation 3 X 50			0%
16							0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

Notes

- Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
- The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special

- skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
 4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
 5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
 6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
 7. **Forms of assessment:** test and non-test.
 8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
 9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
 10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
 11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
 12. TM=Face to face, PT=Structured assignments, BM=Independent study.