TEACHING INSTRUCTIONAL DESIGN (BRP)

COURSE

LABORATORY WORK OF ELECTRONICS 2

by

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Depok
November 2017

PENGANTAR

Teaching Instructional Design (BRP) for Laboratory Work of Electronics 2 course was prepared to be used as a reference for learning the Laboratory Work of Electronics 2 at Undergraduate Physics Study Program Faculty Mathematatics and Natural Science which is followed by 4^{th} semester physics students on the condition that students has taken the course Electronics 1 and Laboratory Work of Electronics 1. In this course, students will be taught to analyze advanced electronic concepts and digital circuits and use the VHDL programming language. It is hoped, this BRP can become a reference in a good learning process for lectures as teachers and students as participants so that the material is conveyed properly and perfect.

Depok, 11 November 2017

Drs. Sastra Kusuma Wijaya Ph.D.

I. General Information

1.	Name of Program / Study Level	:	Physics / Undergraduate
2.	Course Name	:	Laboratory Work of Electronics 2
3.	Course Code	:	SCFI602322
4.	Semester	:	4
5.	Credit	:	1 Credits
6.	Teaching Method(s)	:	Practicum, circuit simulation, report writing, individual assignments, group discussion, and written examinations.
7.	Prerequisite course(s)	:	Electronics 1, Laboratory Work of Electronics 1
8.	Requisite for course(s)	:	-
9.	Integration Between Other Courses	:	-
10.	Lecturer	:	Drs. Sastra Kusuma Wijaya Ph.D.
11.	Course Description	:	After completing this practicum lecture, physics students in 4^{th} semester are able to analyze (C4) advanced electronic concepts and digital circuits as well as using (P4) VHDL programming language in daily life appropriately to solve (A5) existing problems in accordance with applicable computer logic. The language of instruction used in this course is Indonesian.

II. Course Learning Outcome (CLO) and Sub-CLOs

A. CLO

Students are able to analyze (C4) advanced electronic concepts and digital circuits and use (P4) the VHDL programming language in daily life appropriately to solve problems (A5). (ELO(s) 3, 5, 6, 8)

B. Sub-CLOs

1. Able to analyze (C4) and demonstrate (P2) advanced electronic concepts to solve (A5) problems in daily life.
2. Able to analyze (C4) and demonstrate (P2) the concept of digital circuits to solve (A5) problems in daily life.
3. Able to analyze (C4) and report (P2) characteristics of digital circuits and the VHDL programming language and makes (A2) a practicum report according to applicable rules.
4. Able to investigate (C3) and use (P4) VHDL programming language to solve (A5) problems in daily life.

III. Teaching Plan

Week	Sub-CLO	Study Material	Teaching Method	Time Required	Learning Experiences (*O-E-F)	Sub-CLO Weight on Course (%)	Sub-CLO Achievement Indicator	Reference
1	**Introduction**							
2	1-3	Digital Gate AND, OR, NOT, NOR, and NAND	Simulation practicum module using EasyEDA.	200 minutes	20% O, 60% E, 20% F	7.5	Able to report simulation results in the form of practicum reports in accordance with existing rules.	S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, *Module Laboratory Work of Electronics 2*, 2018.
3	1-3	Digital Circuits Binary Addition and Full Adder	Simulation practicum module using EasyEDA.	200 minutes	20% O, 60% E, 20% F	3.75	Able to report simulation results in the form of practicum reports in accordance with existing rules.	S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, *Module Laboratory Work of Electronics 2*, 2018.
4	1-3	Digital Decoder and Encoder Circuits	Simulation practicum module using EasyEDA.	200 minutes	20% O, 60% E, 20% F	3.75	Able to report simulation results in the form of practicum reports in accordance with existing rules.	
5	1-3	Digital Flip-Flops Circuit	Simulation practicum module using EasyEDA.	200 minutes	20% O, 60% E, 20% F	7.5	Able to report simulation results in the form of practicum reports in accordance with existing rules.	S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, *Module Laboratory Work of Electronics 2*, 2018.
6	1-3	Digital Counter Circuits	Simulation practicum module using EasyEDA.	200 minutes	20% O, 60% E, 20% F	7.5	Able to report simulation results in the form of practicum reports in accordance with existing rules.	S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, *Module Laboratory Work of Electronics 2*, 2018.

7	1-3	IC Digital 555 Timer	Simulation practicum module using EasyEDA.	200 minutes	20% O, 60% E, 20% F	7.5	Able to report simulation results in the form of practicum reports in accordance with existing rules.	S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, *Module Laboratory Work of Electronics 2*, 2018.
8	1-4	Half Adder and Full Adder using VHDL	Simulation practicum module using Vivado.	200 minutes	20% O, 60% E, 20% F	6.25	Able to report simulation results in the form of practicum reports in accordance with existing rules.	S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, *Module Laboratory Work of Electronics 2*, 2018.
9	1-4	Decoder using VHDL	Simulation practicum module using Vivado.	200 minutes	20% O, 60% E, 20% F	6.25	Able to report simulation results in the form of practicum reports in accordance with existing rules.	
10	1-4	BCD Seven Segment using VHDL	Simulation practicum module using Vivado.	200 minutes	20% O, 60% E, 20% F	12.5	Able to report simulation results in the form of practicum reports in accordance with existing rules.	S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, *Module Laboratory Work of Electronics 2*, 2018.
11	1-4	Sequential BCD Counter using VHDL	Simulation practicum module using Vivado.	200 minutes	20% O, 60% E, 20% F	12.5	Able to report simulation results in the form of practicum reports in accordance with existing rules.	S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, *Module Laboratory Work of Electronics 2*, 2018.
12	1-4	State Machine using VHDL	Simulation practicum module using Vivado.	200 minutes	20% O, 60% E, 20% F	12.5	Able to report simulation results in the form of practicum reports in accordance with existing rules.	S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, *Module Laboratory Work of Electronics 2*, 2018.
13	1-4	Final Project	Making State Machine as a daily life application using Vivado.	200 minutes	20% O, 60% E, 20% F	6.25	Able to report the final project creation process in the form of proposals and papers in accordance with existing rules.	S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, *Module Laboratory Work of Electronics 2*, 2018.

14	1-4	• Proyek Akhir	Making State Machine as a daily life application using Vivado.	200 minutes	20% O, 60% E, 20% F	6.25	Able to report the final project creation process in the form of proposals and papers in accordance with existing rules.	
15	**Final Exam**							

*) O : Orientation
E : Exercise
F : Feedback

References:

1. S. K. Wijaya, D. W. Hastuti, A. Hifzhi, R. Arif, Module Laboratory Work of Electronics 2, 2018.
2. W. Kleitz, Digital Electronics, A Practical Approach, 9th edition, Prentice Hall, 2012.
3. R. J. Tocci, N.S. Widmer, G.L. Moss, Digital Systems; Principles and Applications, Pearson Prentice-Hall, 2015.

IV. Assignment Design

Week	Assignment Name	Sub-CLOs	Assignment	Scope	Working Procedure	Deadline	Outcome
2-12	Practicum Report	SUB-CLOs 1-4	Make a practicum report	• AND, OR, NOT, NOR, and NAND Gate • Binary addition circuits • Full Adder circuits • Decoder and Encoder circuits • Flip-Flops circuits • Counter circuits • IC Digital 555 Timer • Half Adder and Full Adder using VHDL • Decoder menggunakan VHDL • BCD Seven Segment using VHDL • Sequential BCD Counter using VHDL • State Machine using VHDL	Individual assignment (Homework)	1 week	Practical report uploaded on EMAS
2-12	Practicum Simulation	SUB-CLOs 1-4	Simulate the circuit in practicum module	• AND, OR, NOT, NOR, and NAND Gate • Binary addition circuits • Full Adder circuits • Decoder and Encoder circuits • Flip-Flops circuits • Counter circuits • IC Digital 555 Timer • Half Adder and Full Adder using VHDL • Decoder menggunakan VHDL • BCD Seven Segment using VHDL	Individual assignment (Homework)	1 week	Simulation data uploaded on EMAS

				• Sequential BCD Counter using VHDL • State Machine using VHDL			
2-12	Pre-test and Post-test	SUB-CLOS 1-4	Work on problems	• AND, OR, NOT, NOR, and NAND Gate • Binary addition circuits • Full Adder circuits • Decoder and Encoder circuits • Flip-Flops circuits • Counter circuits • IC Digital 555 Timer • Half Adder and Full Adder using VHDL • Decoder menggunakan VHDL • BCD Seven Segment using VHDL • Sequential BCD Counter using VHDL • State Machine using VHDL	Work on problems at EMAS	40 minutes	Answer sheet uploaded on EMAS
2-12	Discussion	SUB-CLOs 1-2	Discuss practicum modules been working in groups	• AND, OR, NOT, NOR, and NAND Gate • Binary addition circuits • Full Adder circuits • Decoder and Encoder circuits • Flip-Flops circuits • Counter circuits • IC Digital 555 Timer • Half Adder and Full Adder using VHDL • Decoder menggunakan VHDL • BCD Seven Segment using VHDL • Sequential BCD Counter using VHDL • State Machine using VHDL	Discussion and asynchronous at EMAS	1 week	Discussion result uploaded on EMAS

13-14	Final Project	SUB-CLOs 1-4	Making State Machine as a daily life application using Vivado.	• AND, OR, NOT, NOR, and NAND Gate • Binary addition circuits • Full Adder circuits • Decoder and Encoder circuits • Flip-Flops circuits • Counter circuits • IC Digital 555 Timer • Half Adder and Full Adder using VHDL • Decoder menggunakan VHDL • BCD Seven Segment using VHDL • Sequential BCD Counter using VHDL • State Machine using VHDL	1. Designing the final project in groups 2. Writing proposal and paper in groups	1 semester	1. Project uploaded on EMAS 2. Final project proposal uploaded on EMAS 3. Final paper project uploaded on EMAS
15	Final Exam	SUB-CLOs 1, 2, 4	Work on problems	All materials for Electronics Practicum 1	Do the final exam at EMAS	100 minutes	Answer sheet uploaded on EMAS

V. Assessment Criteria (Learning Outcome Evaluation))

Evaluation Type	Sub-CLOs	Instrument / Assessment Type	Frequency	Evaluation Weight (%)
Practicum	1-4	1. Practicum Report 2. Pre-test dan Post-test 3. Simulation module at EasyEDA and Vivado 4. Discussion 5. Practical Work	1 per week	50
Final Project	1-4	1. Proposal 2. Paper 3. Presentation 4. Demonstration	1 semester	25
Final Exam	1,2, 4	Final Eaxam at EMAS UI	1	25
Total				**100**

VI. Rubrics

A. Criteria of Practicum Report Grades

Score	Answer Quality
>90	If the student can complete more than 90% problem correctly
70-89	If the student can complete more than 70% - 89% problem correctly
60-69	If the student can complete more than 60% - 69% problem correctly
55-59	If the student can complete more than 55% - 59% problem correctly
50-54	If the student can complete more than 50% - 54%problem correctly

B. Criteria of Value Proposal and Paper

Kriteria	A (90)	B (75)	C (60)	D (50)
Organization (The whole sequence, flow, and movement)	Information is presented in an effective order. The excellent structure of paragraphs and transitions improves readability and comprehension. The executive summary or abstract is presented first, allowing the reader to easily follow the rest of the report.	Information is logically ordered by paragraphs and transitions. Within a section, the order of ideas are presented may be confusing at times	Information is scattered and needs further development.	There is no clear sequence of paragraphs, so there is no progressive streams of ideas. Details and examples are disorganized, difficult to follow and understand.
Quality of information	Supporting details are specific to the topic and provide the necessary information.	Some details don't support the topic of the report.	Details are a bit vague.	Unable to find certain details
Introduction	Introductory paragraph is clearly stated, has a sharp focus, is different and increases the impact of the report	Introductory paragraph is clearly stated with focus.	Introductory paragraph is unclear.	Introductory paragraph is unclear.
Summary	Summarize paragraphs summarize and draw clear, effective conclusions and increase the impact of the	Summarize the following paragraphs and summarize the discussion report and draw	Closing paragraphs are only remotely related to the topic of the report.	Closing paragraphs is unclear.

	report.	conclusions.		
Use of language: choice words, grammar, and sentence structure	Sentences are complete and grammatical, and they streams together easily. The word is chosen for its proper meaning.	For the most part, sentences are complete and grammatical, and they flow together easily. Every mistake is minor and doesn't distract the reader. Repetition of the same words and phrases is avoided	Minor mistakes in sentence structure and grammar are frequent enough that they detract from the reader and distract from meaning. There are unnecessary repetitions of the same words and phrases	Major mistakes in sentence structure and grammar are frequent enough that they distract the reader and interfere with meaning. There are unnecessary repetitions of the same words and phrases
Use of pictures: numbers, graphs & pictures	All numbers, graphics and images used are accurate, consistent with text, and of good quality. Appropriate and consistent labeling.	For the most part, the numbers, graphics and images used are accurate, consistent with the text, and of good quality. Some labels are imprecise and consistent.	Few of the numbers, graphics, and images used are accurate, consistent with text, and of good quality. They are not properly labeled.	Numbers, graphics, and images are of poor quality, have lots of inaccuracies & mislabelling or none at all.

C. Pre-test, Post-test, and Final Exam

1) Able to express ideas in solving problems (25%)
2) Able to determine the right basic concepts in solving problems (35%)
3) Able to formulate the final solution of problems correcting language errors (30%)
4) Able to use the appropriate important units and figures (10%)

D. Criteria of Practicum Review

Criteria	5	4	3	2	1
Communication	Practitioners provide specific and easy to understand explanations and use various tools / methods to facilitate understanding.	Practitioners provide specific explanations and some are easy to understand and use various tools / methods to facilitate understanding.	Practitioners gave an explanation that was less specific and partly difficult to understand and did not use various tools / methods to facilitate understanding.	Practitioners gave an explanation that was not specific and difficult to understand and did not use various tools / methods to facilitate understanding.	Practitionersgave an explanation that was not specific and could not be understood and did not use various tools / methods to facilitate understanding.
Work Atmosphere	Practitioner suse polite language in their interactions, contribute actively, and don't dominate the discussion.	Practitioners use polite language in their interactions, contribute in part, and don't dominate the discussion.	Practitioners use disrespectful language in their interactions, contributed in part, and dominated the discussion a lot.	Practitioners use language that is not polite in their interactions, doesn't contribute, and really dominates the discussion.	Practitioners use disrespectful language in interacting, doesn't contribute, and dominates the discussion.
Openness	Practitioners provide feedback and respect the opinions of others.	Practitioners provide partial feedback and respect the opinions of others	Practitioners don't provide feedback and don't respect the opinions of others	Practitioners give little feedback and don't respect the opinions of others	Practitioners don't provide feedback and don't respect other people's opinions.
Behaviour	Practitioners work together to conduct experiments and are willing to accept a special and responsible role.	Practitioners work together to experiment and are willing to accept a special role but are less responsible.	Practitioners don't cooperate in conducting experiments even though they are still willing to accept a special role with irresponsibility.	Practitioners are less cooperative in conducting experiments and are not willing to accept special roles	Practitioners don't cooperate in conducting experiments and refuse to accept special roles..

E. Criteria for Psychomotor Value of Practicum Work

Criteria	5	4	3	2	1
Work	Practitioners following all procedures properly and in order	Practitioners following some procedures properly and sequentially	Practitioners following some procedures well but not in order	Practitioners following some procedures poorly and out of order	Practitioners don't follow practicum procedures well
Safety	Practitioners being careful in experimenting and being aware of your surroundings	Practitioners being careful in experimenting and not being aware of your surroundings	Practitioners being less careful in doing experiments and not being aware of their surroundings.	Practitioners being a little careful in experimenting and not being aware of your surroundings.	Practitioners carelessness and harm the surroundings.
Report	Practitioners writing the results of the experiment in a complete and easy to understand manner	Practitioners writing the results of the experiment incomplete and easy to understand	Practitioners writing the results of the experiment incomplete and difficult to understand	Practitioners writing some of the results of the experiment incomplete and not easy to understand	Practitioners does not write the results of the experiment
Active	Practitioners is actively working and shows interest in the experiment and is diligent in discussing / asking questions	Practitioners are actively working but show less interest in the experiment even though they are diligent in discussing / asking questions	Practitioners are less active in work and show less interest in the experiment even though they are diligent in discussing / asking questions	Practitioner is less active in working and shows no interest in the experiment and is less diligent in discussing / asking questions	Practitioner is not actively working and shows no interest in the experiment and does not discuss / ask questions