SYLLABUS

1. **Course name:** Power Electronics in Practice
2. **Course code:** POEP 320262
3. **Credits:** 2 credits (0/6/12)
   Duration: 15 weeks (90h main course and 180h self-study)
4. **Instructors:**
   1/ M.Eng. Hoang Ngoc Van
   2/ M.Eng. Do Duc Tri
   3/ M.Eng. Nguyen Phuong Quang
   4/ M.Eng. Nguyen Thoi
   5/ M.Eng. Pham Huu Thai
5. **Course conditions**
   Prerequisites: Practicing the basic electronics
   Corequisites: Measurement Engineering in Practice
6. **Course Description**

This course provides students the basic knowledge and skills relating to checking power electronic components, assemblying and checking, measuring parameters and signals of circuits to compare with realworks with theories of power stranformation circuits, such as: Circuit converter AC to DC with and without adjusting voltage, double rectifying, adjusting circuits, switching on and off AC voltage, circuit converters and inverters. Moreover, this course also provides the methods of assemblying and checking controlling circuits for power electronic converters. During the time of praticing, the students also practise skills relating to circuit analysis, checking and excomunicating to detect and overcome mailfuntions in workshops. The students have to simulate the laboratory lessons on their computers before going to classes.

7. **Course Goals**

Goals	***Goal description*** *(This course provides students:)*	**ELOs**
G1	Basic knowledge and assemblying techniques in power electronic circuits.	1.1, 1.2
G2	An ability to analyze, assembly, and test power electronic circuits.	2.2
G3	An ability to use tools of modern technologies to conduct the lab lessons.	4.4
G4	An ability to read English documents about the power converters.	2.1
G5	An ability to calculate power electronic circuits.	1.3

** Note: High: H; Medium: M; Low: L*

8. Chuẩn đầu ra của học phần

CLOs		***Description*** *(After completing this course, students can:)*	**Outcomes**
G1	G1.1	Use the measuring equipments, laboratory modules of power electronic circuit and assemblying methods on experimental modules.	1.1, 1.2
	G1.2	Be able to present the structures, characteristics of components, principles and conveting forms of power electronics.	1.1, 1.2
G2	G2.1	Analyze and fix the errors occured when assembling and testing the rectifier circuits, AC-AC converters.	2.2
	G2.2	Analyze and fix the errors occured when assembling and testing the DC-DC converters and inverters.	2.2
G3	G3.1	Simulate the uncontrolled and controlled rectifiers, AC-AC converters, DC-DC converters by using Proteus or MATLAB.	4.4
	G3.2	Simulate inverters using Proteus or MATLAB.	4.4
G4	G4.1	Read the datatsheets of electronic components dedicated in power electronics.	2.1
	G4.2	Understande the English terminologies used in Power electronics.	2.1
G5	G5.1	Assemble and operate uncontrolled-controlled rectifiers and AC-AC converters.	1.3
	G5.2	Assemble and operate DC-DC converter curcuits and inverters.	1.3

9. Study materials

- Textbooks:

[1] Hoang Ngoc Van, *Practical Guide power electronic*, University of education and technology HCM, 2016.

[2] Do Duc Tri, PSIM application in power electronics, University of education and technology HCM, 2014.

- References:

[1] Do Duc Tri, *Electronics Practice*, Publishers Hanoi Polytechnic in 2015.

10. Sudent Assessments:

- Grading points: **10**
- Planning for students assessment is followed:

Type	**Contents**	**Linetime**	**Assessment techniques**	**CLOs**	**Rates (%)**
Midterms					**70**
TN#1	Uncontrol Rectifier.	Weeks 2	Experiments modules and book reports	G1.2 G3.1 G4.1 G5.1	5

TN#2	Single-phase, star-connected controlled rectifier	Weeks 4	Experiments modules and book reports	G3.1 G4.1 G5.1	5
TN#3	Three-phase controlled rectifier	Weeks 6	Experiments modules and book reports	G3.1 G4.1 G5.1	10
TN#4	AC to AC Converter	Weeks 8	Experiments modules and book reports	G3.1 G4.1 G5.1	5
MP#1	Simulation of uncontrolled rectifier, controlled rectifier and AC to AC converter	Weeks 9	Computer	G3.2	15
TN#5	DC to DC Converter Biến đổi DC-DC.	Weeks 10	Experiments modules and book reports	G3.1 G4.1 G5.2	5
TN#6	Six-tep Inverter	Weeks 12	Experiments modules and book reports	G3.2 G4.1 G5.2	5
TN#7	Inverter SinPWM	Weeks 13	Experiments modules and book reports	G3.2 G4.1 G5.2	5
MP#2	Simulate of DC-DC converter, Six-tep Inverter, SinPWM Inverter.	Weeks 14	Computer	G3.2	15
Final exam					**30**
E	Questions and Answers	Weeks 15	Questions and Answers	G1.1 G4.2 G5.1	30

11. Course details:

Weeks	Contents	CLOs
1	***Lesson 1:*** **<METHODS FOR TESTING THE POWER ELECTRONIC COMPONENTS. INTRODUCED EXPERIMENT EQUIPMENTS. WORKSHOP RULES>** *(1/5/3)*	
	A/* Contents and pedagogical methods: (6)* **Contents:** 1.1 Workshops rules 1.2 Introducing common rules of using the text books 1.3 Methods for testing the power electronic components 1.4 Introducing power electronic simulatoin software. **Teaching methods**: + Presentation	G1.1 G1.2

	+ Modeling instruction	
	***B/* Self-study contents:** *(3)* + Searching the datasheets of power electronic components in English. + Reading the objectives, contents, questions and preparations for laboratory lesson 2 + Simulating practical uncontrolled rectifiers	G1.2 G3.1 G4.1
2	***Lesson 2:* <THE UNCONTROLLED RECTIFIERS>** *(1/5/3)*	
	A/* Contents and pedagogical methods: (6)* **Contents:** 2.1 Single-phase rectifiers 2.2 Three-phase rectifiers 2.3 Double three-phase three-pulse and star-connected rectifiers **Pedagogical methods**: + Presentation + Modeling guidelines	G2.1 G5.1
	***B/* Self-study contents**: *(3)* + Handling practical results, answering questions from the end of the exercise 2 (in their reports) + Reading the objectives, contents, questions and preparing for the end of the laboratory lesson 3 + Using software to create unsynchronous pulse control for SCR, TRIAC + Learning the diagram AC-DC converter in English	G1.2 G3.1 G4.1
3	***Lesson 3:* <THE PULSE GENERATOR CIRCUITS AND UNSYNCHRONOUS CONTROLLERS FOR SCR, TRIAC>** *(1/5/3)*	
	A/* Contents and pedagogical methods: (6)* **Contents:** 3.1 The control of SCR, TRIAC with DC sources 3.2 The control of SCR, TRIAC with AC sources **Pedagogical methods**: + Presentation + Modeling guidelines	G1.2 G2.1 G5.1
	***B/* Self-study contents**: *(3)* + Handling practical results, answering questions from the end of the exercise 3 (in their reports) + Reading the objectives, contents, questions and preparation for the end of the practice lesson 4 (in their report) + Using simulation software for Single-phase one pulse controlled rectifiers with different load types;	G1.2 G3.1 G4.1
4	***Lesson 4:* <THE PULSE GENERATOR SYNCHRONOUS CONTROLLERS FOR SCR, TRIAC>** *(1/5/3)*	

	A/* Contents and pedagogical methods: (6)* **Contents:** 4.1 Pulse generators for synchronous used UJT 4.2 Pulse generator for synchronous style vertical linears **Pedagogical methods**: + Presentation + Modeling guidelines	G1.2 G2.1 G5.1
	***B/* Self-study contents**: *(3)* + Handling practice results, answering questions from the end of the exercise 4 (in their report); + Reading the objectives, contents, questions and preparation for the end of the laboratory lesson 5, 6 (in their report) + Using simulation software Double Single-phase two pulse, star-connected controlled rectifier and Single-phase fully-controlled bridge rectifier with different load types;	G1.2 G3.1 G4.1
5	***Lesson 5:* <DOUBLE SINGLE-PHASE TWO PULSE, STAR-CONNECTED CONTROLLED RECTIFIERS>**. ***Lesson 6**:* **<SINGLE-PHASE FULLY-CONTROLLED BRIDGE RECTIFIERS>** *(1/5/3)*	
	A/* Contents and pedagogical methods: (6)* **Contents:** 5.1 Double Single-phase two pulses and star-connected controlled rectifiers 6.1 Single-phase fully-controlled bridge rectifiers **Pedagogical methods**: + Presentation + Modeling guidelines	G1.2 G2.1 G5.1
	***B/* Self-study contents**: *(3)* + Handling practice results, answer questions from the end of the exercise 5, 6 (in their report); + Reading the objectives, contents, questions and prepare for the end of the laboratory lesson 7 (in their report); + Using software simulation Single-phase fully-controlled bridge rectifier, Three-phase three-pulse, star-connected controlled rectifier and double three-phase six-pulse, star-connected controlled rectifier with different load types;	G1.2 G3.1 G4.1
6	***Lesson 7:* <THREE-PHASE THREE-PULSE, STAR-CONNECTED CONTROLLED RECTIFIER AND DOUBLE THREE-PHASE SIX-PULSE, AND STAR-CONNECTED CONTROLLED RECTIFIERS>** *(1/5/3)*	
	A/* Contents and pedagogical methods: (6)* **Contents:** 7.1. Three-phase three-pulse, star-connected controlled rectifier and double three-phase six-pulse, star-connected controlled	G1.2 G2.1 G5.1

	rectifier with pulse beam 7.2. Three-phase three-pulse, star-connected controlled rectifier and double three-phase six-pulse, star-connected controlled rectifiers with linear vertical pulses **Pedagogical methods**: + Presentation + Modeling guidelines	
	***B/* Self-study contents**: *(3)* + Handling practice results, answer questions from the end of the exercise 7 (in their report) + Reading the objectives, contents, questions and preparing for the last practice lesson 8 (in their report) + Using software simulation Single-phase semi-controlled bridge rectifier and Three-phase fully-controlled bridge rectifier with different load types	G1.2 G3.1 G4.1
7	***Lesson 8:* <THREE-PHASE FULLY-CONTROLLED BRIDGE RECTIFIERS>** *(1/5/3)*	
	A/* Contents and pedagogical methods: (6)* **Contents:** 8.1 Single-phase semi-controlled bridge rectifiers 8.2 Three-phase fully-controlled bridge rectifiers **Pedagogical methods**: + Presentation + Modeling guidelines	G1.2 G2.1 G5.1
	***B/* Self-study contents**: *(3)* + Handling practice results, answer questions from the end of the exercise 8 (in their report) + Reading the objectives, contents, questions and prepare for the end of the practice lesson 9 (in their report); + Using simulation software for dual rectifier curcuits single-phases and three-phasess	G1.2 G3.1 G4.1
8	***Lesson 9:* <DUAL SINGLE-PHASE FULLY CONTROLLED BRIDGE RECTIFIERS>** *(1/5/3)*	
	A/* Contents and pedagogical methods: (6)* **Contents:** 9.1 Dual-phase rectifiers with two DC sources 9.2 Dual-phase rectifiers with one DC sources 9.3 Dual three-phase rectifiers **Pedagogical methods**: + Presentation + Modeling guidelines	G1.2 G2.1 G5.1
	***B/* Self-study contents**: *(12)*	G1.2 G3.1

	+ Handling practice results, answering questions from the end of the exercise 9 (in their report) + Reading the objectives, contents, questions and preparing for the end of the practice lesson 10 (in their report) + 3. Using simulation software to adjust the voltage single-phase and three-phase AC with different load types	G4.1
9	***Lesson 10:*** **<ADJUSTABLE AC VOLTAGE CIRCUIT SINGLE-PHASE, THREE-PHASE>** *(1/5/3)*	
	A/ **Contents and pedagogical methods***: (6)* **Contents:** 10.1 single-phase AC voltage converters 10.2 three-phase AC voltage converter with neutral 10.3 Three-phase AC voltageconverter without neural **Pedagogical methods**: + Presentation + Modeling guidelines	G1.2 G2.1 G5.1
	B/ **Self-study contents**: *(3)* + Handling practice results, answer questions from the end of the exercise 10 (in their report) + Reading the objectives, contents, questions and preparing for the end of the practice lesson 11 (in their report); + 3. Using simulation software switching AC voltage circuit single-phase and three-phase with different load types;	G1.2 G3.1 G4.1
10	***Lesson 11:*** **<SWITCHING AC VOLTAGE CIRCUIT SINGLE-PHASE AND THREE-PHASE VOLTAGES>** *(1/5/3)*	
	A/ **Contents and pedagogical methods***: (6)* **Contents:** 11.1 Three-phase AC voltage converters 11.2 Switching AC voltage circuits single-phase and three-phases **Pedagogical methods**: + Presentation + Modeling instructions	G1.2 G2.2 G5.1
	B/ **Self-study contents**: *(3)* + Handling practice results, answer questions from the end of the exercise 11 (in their report) + Reading the objectives, contents, questions and prepare for the end of the practice lesson 12 (in their report); + 3. Using simulation software voltage converter from DC to DC Buck and Boost forms	G1.2 G3.1 G4.2
11	***Lesson 12:*** **<DC-DC VOLTAGE CONVERTER TYPE STEP DOWN BUCK>** *(1/5/3)*	
	A/ **Contents and pedagogical methods***: (6)*	G1.2 G2.2

	Contents: 12.1 DC-DC voltage converters in the Step Down Buck type 12.2 DC-DC voltage converters in the type of Step Up Boost **Pedagogical methods**: + Presentation + Modeling instructions	G5.2
	***B/* Self-study contents**: *(3)* + Handling practice results and answering questions from the end of the exercise 12 (in their report) + Reading the objectives, contents, questions and prepare for the last practice lesson 13 (in their report); + Using simulation software for single-phase inverter curcuits	G1.2 G3.2 G4.2
12	***Lesson 13:* <SINGLE-PHASE FULL-BRIDGE INVERTERS>** (1/5/3)	
	A/* Contents and pedagogical methods: (6)* **Contents:** 13.1 Single-Phase Full-Bridge Inverters with two DC sources 13.2 Single-Phase Full-Bridge Inverters with one DC sources **Pedagogical methods**: + Presentation + Modeling guideliness	G1.2 G2.2 G5.2
	***B/* Self-study contents**: *(3)* + Handling practice results and answering questions from the end of the exercise 13 (in their report) + Reading the objectives, contents, questions and preparing for the last practice lesson 14 (in their report) + Using simulation software inverter circuits in the 6-step type	G1.2 G3.2 G4.2
13	***Lesson 14:* <THREE-PHASE FULL-BRIDGE 6-STEP INVERTER>** *(1/5/3)*	
	A/* Contents and pedagogical methods: (6)* **Contents:** 14.1 Three-Phase Full-Bridge 6-step Inverter **Pedagogical methods**: + Presentation + Modeling guidelines	G1.2 G2.2 G5.2
	***B/* Self-study contents**: *(12)* + Handling practice results and answer questions from the end of the exercise 14 (in their report) + Reading the objectives, contents, questions and prepare for the end of the practice lesson 15 (in their report); + 3. Using simulation software inverter circuit pulse width modulation type SinPWM;	G1.2 G3.2 G4.2

	Lesson 15: **<THREE-PHASE FULL-BRIDGE INVERTER TYPE OF SINPWM>** *(1/5/3)*	
14	***A/*** **Contents and pedagogical methods***: (6)* **Contents:** 15.1 The 3-Phase Full-Bridge Inverter type of SinPWM **Pedagogical methods**: + Presentation + Modeling guidelines	G1.2 G2.2 G5.2
	B/ **Self-study contents**: *(12)* + Handling practice results, answer questions from the end of end of the exercise 15 (in their report) + Reading the objectives, contents, questions from lesson 1 to 15 (in their report); + 3. Using simulation software to all power electronic circuits	G1.2 G3.1 G4.3
	Lesson 16: **<EXAM END OF TERM, REVIEW CADEMIC KNOWLEDGE OF ALL SECTIONS>** *(1/5/3)*	
15	**A/ Contents and pedagogical methods**: (6) **Contents:** 15.1 The final examination in the form of oral tests 15.2 Reviewing and conclusion of the course; 15.3 Collecting and evaluating the homework projects of students	G1.2 G3.1 G5.1 G5.2
	B/ **Self-study contents:** (3) + Strengthening the knowledge and skills learned to serve for other related subjects	G1.2 G3.1 G5.1 G5.2

12. Learning ethics:

Homeworks and projects must be done by the students themselves. Plagiarisms found in the assessments will get the zero point.

13. First approved date:

14. Approval by:

Dean	**Department**	**Instructor**
Assoc. Prof. PhD. Nguyen Minh Tam	**Assoc. Prof. PhD. Nguyen Thanh Hai**	**M.Eng. Hoang Ngoc Van**

15. Syllabus updated process

1st time: Updated content dated, **August 1st 2014**	Instructors

	Head of department
2nd time: Updated content dated, **August 1st 2016**	Instructors Head of department