Kurdistan Regional Government
Ministry of Higher Education & Scintific Research

University of Halabja

حکومەتی هەرێمی کوردستان
وەزارەتی خوێندنی باڵا و توێژینەوەی زانستی

زانکۆی هەڵەبجە

2023- 2024 Academic Year

ساڵی خوێندنی ٢٠٢٣ - ٢٠٢٤

Department: ناوی بەش	Physsics department بەشی فیزیا					
College : کۆلێج	College of scince					
Student : خوێندکار	3rd degree Bochler of Science (BS.c) بازنەی یەکەم - بەکالۆریۆس	Academic profile				
Specialty : پسپۆری	زانستی فیزیایی					
Subject : بابەت	Electronics					
Language of instruction زمانی ووتنەوەی وانە English	Language of instruction زمانی ووتنەوەی وانە	Lecture وانە	Activity چالاکی	L/P تاقیگە	S سیمینار	
		8	6	8	0	
Status item دۆخی وانەکە	Semestr وەرز	Form of assessment شێوازی هەڵسەنگاندن	Code ECTS کۆدی وانە	ECTS For the item: ژمارەی ECTS بۆ وانەکە		
Specialty subject بابەتی پسپۆری	2nd دووەم	Exam تاقیکردنەوە	UOH102603	6		
Title Surname Name Responsible for the item: نازناوی زانستی و ناوی ماموستای وانە	Lecturer , Mr. Farhad Muhsin Mahmood					

Course Book :SUBJECT MATTER

Objectives of the subject: ئامانجەکانی وانەکە	
Objec. 1 ئامانجی ١	1.Have Brief Idea about Electricity and Electronics
Objec. 2 ئامانجی ٢	2.Understanding the meaning of electronic tools and their applications.
Objec. 3 ئامانجی ٣	3.To learn about semiconductor which is the most important sub material in the electronic and transistors and the basic block of Ics.
Objec. 4 ئامانجی ٤	4.Know and try to Make a intelligent and techno-logistic day by electronic.

Prerequisites in terms of knowledge, skills and other competencies: داواکارییە سەرەکییەکان لەرووی زانین و لێهاتووی و تواناکانی دیکە	
knowl. 1 زانینی ١	Semiconductor, Electron transition , Electrical Conductivity of Semiconductors, Physical Properties of Semiconductors, Binary digit and Ics working

Learning outcomes (for the subject chosen in line 7) :
دەرئەنجامەکانی فێرکردن

Learning Outcome دەرئەنجامی فێرکردن	Symbol سیمبوول	Description ووردەکاری (kind of activities)	Reference to the directional effects of education ئاماژەدان لەسەر کاریگەری ئاراستەکردنی
LO1	l_L02	Having successfully completed this module, you will be able to demonstrate knowledge and understanding of: Transistors Types	
LO2	l_L05	BJT transistors, its specifications and working principle.	
LO3	l_L06	being continoue with BJT for more details	
LO4	l_S04	Start to teaching FETs, their working, specifications and application	
LO5	l_S06	Digital Logic Gates, their priciple of working, their specification and applications	

Program content

Form of classes لە کلاسەوە	Topics of lectures بابەتەکانی وانەکە	Number of Hours ژمارەی کاژمێرەکان

Chapter One	Chapter One: Bipolar Junction Transistors (BJT)-1 1. Historical review of Transistors 2. Bipolar junction transistor introduction 3. BJT operation modes 4. NPN transistor 5. PNP transistor 6. Transistor construction 7. Transistor currents	7
Chapter Two	Chapter Two: Bipolar Junction Transistors (BJT)-2 1. Types of transistor configuration 2. Common base configuration 3. Common emitter configuration 4. Common collector configuration	10
Chapter Three	Chapter Three: Field Effect transistors 1. Review of BJT 2. Introduction (FET) 3. Junction Field Effect Transistor (JFET) 4. Working of JFET 5. Characteristics of JFET 6. Metal Oxide Semiconductor Transistors (MOSFET) 7. Modes of Biasing for Transistors 8. Application of Transistor 9. IGBT & Comparison Table 10. Internal Structure of IGBT 11. Working of IGBT 12. Type of IGBT 13. Switching Characteristics of IGBT	8
Chapter Four	Chapter Four: Power Amplifier 1. Introduction, 2. Series-Fed Class A Amplifier, 3. Transformer-Coupled Class A Amplifier, 4. Transformer-Coupled Class A Amplifier, 5. Class B Amplifier Circuits	8
Chapter Five	Chapter Five: 1. Introduction 2. Classification of Integrated Circuits 3. Digital Logic States 4. TTL and CMOS Logic Levels 5. Digital Logic States 6. Digital Logic “AND” Gate 7. Digital Logic “OR” Gate 8. Digital Logic “NOT” Gate 9. Digital Logic “NAND” Gate 10. Digital Logic “NOR” Gate , 11.Digital Logic “EX-OR” Gate, 12.Digital Logic “EX-NOR” Gate, 13.Review	6
	Topics of exercises (Activity) **بابەتەکانی هەڵسەنگاندن**	**Number of Hours** **ژمارەی کاژمێرەکان**
Exe. 1 **هەڵسەنگاندنی ١**	Chapter One	2
Exe. 2 **هەڵسەنگاندنی ٢**	Chapter Two	4
Exe. 3 **هەڵسەنگاندنی ٣**	Chapter Three	2
Exe.4 **هەڵسەنگاندنی ٤**	Chapter Four	2
Exe. 5 **هەڵسەنگاندنی ٥**	Chapter Five	2
Exe. 6		
	Topics in seminars (or other classes) **بابەتەکانی سیمینار**	**Number of Hours** **ژمارەی کاژمێرەکان**
Sem. 1	Topics will be confirmed prior to the seminar	
Sem. 2	Topics will be confirmed prior to the seminar	
	Subjects of laboratories **بابەتەکانی تاقیگە**	**Number of Hours** **ژمارەی کاژمێرەکان**
Lab. 1 **تاقیگە ١**	Experiment 1 : Capacitor filtering	3
Lab. 2 **تاقیگە ٢**	Experiment 2 : Voltage Doubler	3
Lab. 3 **تاقیگە ٣**	Experiment 3: BJT Characteristics	3
Lab. 4 **تاقیگە ٤**	Experiment 4: FET Characyeristics	3
Lab. 5 **تاقیگە ٥**	Experiment 5: IGBT Characteristics	3
Lab. 6 **تاقیگە ٦**	Experiment 6: Digital logic AND, OR, NAND, NOR	3

Lab. 7 **تاقیگە ۷**	Experiment 7: Digital logic Mixed Objects of the experiments	3	
Lab. 8 **تاقیگ8**		3	

Didactic methods **ڕێگاکانی وانە ووتنەوە**		**Comments** **کۆمێنت**
D.M. 1 **ڕێگای ١**	Vedio learning method	Vedio , Powerpoint , Other
D.M.2 **ڕێگای ٢**	E-intro lecture, laboratory or auditorium exercises;	Google Meet , Unvirsity Porta
D.M. 3 **ڕێگای ٣**	Usin gstudent-Centred Approcah	Online meet
D.M.4 **ڕێگای ٤**	PBL	

Student workload
کۆششی خوێندکار

Form of activity **لە چالاکییەکانەوە**	**Mean number of hours to complete a given activity** **نێوەندی کاژمێرەکان بۆ تەواو کردنی چالاکییەکی دیاری کراو**
Contact hours with lead subjects کاژمێرەکانی پەیوەندی لەگەڵ بابەتە سەرەکییەکدا	66
Preparing for the lab or exercises ئامادەبوون لە تاقیگە و ئەنجامدانی چالاکی	50
Preparing to pass ئامادەکاری بۆ دەرچوون	20
Work in the library کارکردن لە کتێبخانەدا	0
Preparing the project کارکردن لە پڕۆژە	26
Sum: کۆ	162
ECTS sums for obligatory subjects (PO, PP and PK)	**PO: 26,25, PP: 28 PK: 42 SUM: 19**

Literature or Bibliography

primary:
سەرەکی

Semiconductor Physics

Further:
لاوەکی یاخوود زیادە

https://www.electronicshub.org/applications-of-diodes/
https://www.digikey.com/en/maker/blogs/zener-diode-basic-operation-and-applications https://electronics.howstuffworks.com/led4.htm https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits/semiconductor- diodes/varactordiode-construction-definition-working.html https://www.electronics-tutorials.ws/transistor/tran_5.html
https://www.electronics-tutorials.ws/category/premium Recommended Book:
ELECTRONIC DEVICES AND CIRCUIT THEORY , ROBERT BOYLESTAD LOUIS NASHELSKY
Foundations of Analog and Digital Electronic Circuits , anant agarwal
Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology ,jeffrey h.lang Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology

Lead person (academic title, first name, last name, email address)
زانیاری ستافی ئەکادیمی تایبەت بەم وانەیە

1	Lecturer , Mr Farhad Muhsin Mahmood, farhad.mahmood@uoh.edu.iq

Methods of verification of learning outcomes
ڕێگای بەدەست هێنانی دەرئەنجامەکانی فێرکردن

	Passing criterion **پێوەرەکانی دەرچوون**	Verification method ڕێگای بەدەست هێنان	Comments کۆمێنت
Efekt1	BJT transistors	Activity during classes,	
Efekt2	FET Transistors	Activity during classes,	
Efekt3	IGBT Transistor	Activity during classes,	
Efekt4	Power amplifier	Activity during classes,	
Efekt5	Digital logi gate	Activity during classes,	
Efekt6, Efekt7			

Course requirements
داواکاری کۆرس

mark of the course includes:
1- Pop Activity of the course (50 marks).
2- Midterm exams (20 marks).
3- The final exams (30 marks).
The final mark of the course includes 30% of the final mark, 20% of the midterm and %50 of the Activity

Other useful information about the item
هەر زانیارییەکانی دیکە پێویست بۆ بابەتەکە

1	Information on where to read the teaching materials	University website, Portal and online meet
2	Information about the place of classes	Virtual Head office, information board

3	Information on the dates of classes (course schedule)	A schedule of classes in accordance with the established schedule
4	Information on the dates and place of consultation of teachers conducting the subject	Virtual Head's office, information board