



Ministry of Higher Education and
Scientific Research - Iraq
University of Baghdad
College of Engineering
Department of Computer Engineering



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Electronic Circuits		Module Delivery
Module Type	CORE		Class lecture + Lab
Module Code	COE209		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	2	Semester of Delivery	4
Administering Department	Computer	College	Engineering
Module Leader	Maher Faeq Ismail	e-mail	maherfaik3@alnaji-uni.edu.iq
Module Leader's Acad. Title	Lect. Dr.	Module Leader's Qualification	Ph.D
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Review Committee Approval	30/5/2024	Version Number	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	COE110 Semiconductor physics COE109 Electrical Circuits and Systems	Semester	2 2
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this module is to provide students with a comprehensive understanding of electronic circuits, focusing on various types of transistors, operational amplifiers, digital circuits, and their applications. The course aims to equip students with the knowledge and skills necessary to analyze, design, and implement electronic circuits for a wide range of applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: 1. Understand Field Effect Transistors (FETs) - Describe the construction and operation of Junction Field Effect Transistors (JFETs), Depletion-mode Metal-Oxide-Semiconductor Field Effect Transistors (DMOSFETs), and Enhancement-mode Metal-Oxide-Semiconductor Field Effect Transistors (EMOSFETs). 2. Analyze and Design Operational Amplifiers (Op-Amps) - Explain the characteristics and applications of operational amplifiers, both linear and non-linear. - Design and analyze circuits using operational amplifiers for various applications. 3. Understand Active Filters - Analyze and design active filters for signal processing applications. 4. Analyze and Design Data Converters - Describe the principles and operation of Digital-to-Analog Converters (DACs) and Analog-to-Digital Converters (ADCs). - Design and analyze data converter circuits. 5. Understand Multivibrators - Describe the operation and applications of bistable, monostable, and astable multivibrators. - Design and analyze multivibrator circuits using 555 timers. 6. Analyze and Design Digital Circuits - Describe digital integrated circuit (IC) technologies and logic families. - Analyze and design digital circuits using Bipolar Junction Transistors (BJTs), Transistor-Transistor Logic (TTL), Emitter-Coupled Logic (ECL), NMOS, and CMOS technologies. 7. Understand Latches and Flip Flops - Explain the operation of latches and flip flops as basic memory units in digital circuits. 8. Develop Practical Skills through Laboratory Experiments - Perform experiments on field-effect transistor characteristics, operational amplifier applications, active filters, data converters, multivibrators, and digital circuits.

Indicative Contents المحتويات الإرشادية	Week 1-2: Field Effect Transistors • Topics: Construction and operation of JFETs, DMOSFETs, and EMOSFETs. • Lab: EXP 1: Field Effect Transistor Characteristics Week 3-4: Operational Amplifiers • Topics: Characteristics and applications of operational amplifiers (linear and non-linear). • Lab: EXP 2: Linear Applications of Operational Amplifiers Week 5-6: Active Filters • Topics: Analysis and design of active filters. • Lab: EXP 3: Non-linear Applications of Operational Amplifiers Week 7-8: Data Converters • Topics: Principles and operation of DACs and ADCs. • Lab: EXP 4: Active Filters Week 9-10: Multivibrators • Topics: Bistable, monostable, and astable multivibrators using 555 timers. • Lab: EXP 5: Data Converters Week 11-13: Digital Circuits • Topics: Digital IC technologies, logic families, BJT digital circuits, TTL, ECL, NMOS, and CMOS circuits. • Lab: EXP 6: 555 Timer Applications Week 14-15: Latches and Flip Flops • Topics: Basic memory units using CMOS transistors. • Lab: EXP 7: Multivibrators Week 16: Final Exam This structure ensures a balanced approach to learning, combining theoretical concepts with practical experimentation, to prepare students for understanding, designing, and implementing electronic circuits effectively.
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1) Lectures. 2) Homework and Assignments. 3) Tests and Exams. 4) In-Class Questions and Discussions. 5) Extracurricular Activities. 6) Seminars. 7) In- and Out-Class oral conversations.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	5.267
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	3.067
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	3, 7, 11	LO #1 - 6
	Assignments	2	5% (5)	8, 14	LO #2 - 7
	Lab.	7	20% (20)	1-15	LO #1 - 8
Summative assessment	Project	1	5% (5)	12	LO #1 - 8
	Mid Exam	1	10% (10)	15	LO #1 - 4
	Final Exam	4 hr	50% (50)	16	LO #1 - 7
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
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Week 1	Field Effect Transistors Construction and Operation (JFET, DMOSFET and EMOSFET)
Week 2	Field Effect Transistors Construction and Operation (continued) (JFET, DMOSFET and EMOSFET)
Week 3	Operational Amplifiers. Characteristics and Applications (linear and non-linear).
Week 4	Operational Amplifiers. (continued) Characteristics and Applications (linear and non-linear).
Week 5	Active filters analysis
Week 6	Active filters design
Week 7	Data Converters (Digital to Analog Converters and Analog to Digital Converters).
Week 8	Multivibrators Bistable, monostable and astable multivibrators (using 555 timers)
Week 9	Digital Circuits. (Digital IC Technologies and Logic Circuit Families), Logic Circuit Characterization
Week 10	Bipolar Junction Transistors Digital Circuits. The VTC of the BJT inverter and Early Forms of BJT digital Circuits.
Week 11	Transistor-Transistor Logic circuits (TTL or T2L) Basic TTL NAND gate, TTL NAND gate with totem pole output stage, and TTL with improved performance.
Week 12	Emitter Coupled Logic circuits (ECL) The basic ECL gate design and Analysis.
Week 13	MOS Digital Circuits (NMOS and CMOS) The analysis of an Enhancement NMOS inverter with an Enhancement load
Week 14	The Analysis of an Enhancement CMOS inverter and the implementation of Logic circuits using NMOS logic gates and CMOS logic gates
Week 15	Latches and Flip Flops The latch as the basic memory unit using CMOS transistors
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)	
المناهج الأسبوعي المختبر	
	Material Covered
Week 1,2	EXP 1: Field Effect Transistor Characteristics
Week 3-4	EXP 2: Linear Applications of Operational Amplifiers
Week 5-6	EXP 3: non - Linear Applications of Operational Amplifiers
Week 7-8	EXP 4: Active filters
Week 9,10	EXP 5: Data Converters
Week 11,13	EXP 6: 555 Timer Applications
Week 14,15	EXP 7: Multivibrators

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	"Microelectronic Circuits", Sedra, Smith, Fourth edition or Fifth edition, Oxford University Press, 1998-2003.	Yes
Recommended Texts	• "Electronic Devices and Circuit Theory", Robert Boylestad, Louis Nashelsky, 10th Edition , 2009. • "Semiconductor Physics and Devices" , Donald A. Neamen, 3rd edition, 2003	Yes
Websites		

APPENDIX:

GRADING SCHEME				
مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings

	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

