

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Electronics II		Module Delivery
Module Type	Basic		☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	MDER220		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	2	Semester of Delivery	
Administering Department	Biomedical engineering	College	College of Engineering
Module Leader	Abdulghaffar S M.	e-mail	abd199911@edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Abdulghaffar S M.	e-mail	abd199911@edu.iq
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date		Version Number	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MDER120	Semester	3
Co-requisites module		Semester	

جامعة العين العراقية
 قسم الطب الحيوي
 كلية الهندسة
 (Signature)

Module Aims, Learning Outcomes and Indicative Contents

Module Aims أهداف المادة الدراسية	Use intuition to describe the approximate time and frequency behavior of circuits containing energy storage elements. Understand the concepts of employing simple models to represent non-linear and active elements-such as the MOSFET-in circuits. Build circuits and take measurements of circuit variables using tools such as oscilloscopes, multimeters, and signal generators. Compare the measurements with the behavior predicted by mathematical models and explain the discrepancies. Understand the relationship between the mathematical representation of circuit behavior and corresponding real-life effects. Appreciate the practical significance of the systems developed in the course.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge	A2	A2.1 Recall fundamental concepts of JFET and MOSFET devices, including structure, operation principles, and V-I characteristics. A2.2 Interpret device characteristics and equivalent circuit representations (such as low-frequency models, Y-parameters, and h-parameters) and describe their relationship to practical circuit behavior. A2.3 Describe the principles of biasing configurations for JFET and MOSFET, and explain their role in establishing stable operating points in electronic circuits. A2.4 Solve electronic circuit problems involving JFET and MOSFET amplifiers, including AC analysis using equivalent models and parameter-based methods. A2.5 Design electronic circuits such as current sources, multi-stage amplifiers, and operational amplifier circuits (inverting, non-inverting, summing, differentiating). A2.6 Analyze the performance of electronic circuits, including frequency response, gain-bandwidth product, cascading effects, output voltage swing, and saturation in operational amplifiers.
		A4	A4.1 Recognize the components and instruments used in electronics experiments, including JFET, MOSFET, operational amplifiers, oscilloscopes, function generators, and power supplies. A4.2 Explain the observed behavior of JFET and MOSFET circuits through experimental results, including V-I characteristics, biasing effects, and amplifier operation.



			A4.3 Measure voltage, current, gain, and frequency response, and determine circuit parameters using laboratory instruments such as oscilloscopes and multimeters. A4.4 Apply electronic circuit principles to construct JFET/MOSFET amplifier circuits and operational amplifier configurations (inverting, non-inverting, summing, differentiating). A4.5 Examine electronic circuits to determine key performance parameters, including gain, bandwidth, stability, and the effect of cascading and loading.
	Skills	B1	B1.1 Communicate effectively B1.2 Students will have developed problem solving and reasoning abilities that will serve them well in many important petroleum engineering aspects as well as their lives.
		B2	B2.1 Communicate effectively – graphically with a range of audiences using contemporary tools. B2.2 Communicate verbally and in writing with a range of audiences using contemporary tools.
	Ethics	C2	C2.1 Recognize professional and ethical responsibility. C2.2 Adhere and respect diversity.
Indicative Contents			Unit – I [25 hrs] FET and JFET Transistors: Introduction, device structures and physical operations, i-v characteristics, DC and AC load line, brief analysis as an amplifier. MOS Field Effect Transistors: Introduction, device structures and physical operations, i-v characteristics, brief analysis as an amplifier, and as a switch, Biasing, Unit-II [25 hrs] FET and MOSFET circuits: DC biasing; self-bias; feedback bias; voltage divider bias, fixed bias; AC analysis; Y-parameters analysis; H-parameters analysis FET and MOSFET small signal operation: models, single stage FET Amplifiers, MOSFET capacitances, common gate configuration; common source configuration; common drain configuration frequency response of CS amplifiers. Unit-III [25 hrs] Amplifiers circuits: MOS differential Pair, Small signal operation, frequency response of differential amplifier, Introduction to differential amplifier with active load. Multistage amplifiers: direct; capacitor coupled amplifier; cascade amplifier; cascode



	amplifier. Operational amplifier (OpAmp): Definition; structure design; inverting configuration; non-inverting configuration; summing amplifier; integration amplifier; differentiation amplifier.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	93	Structured SWL (h/w)	1.34
Unstructured SWL (h/sem)	32	Unstructured SWL (h/w)	3.9
Total SWL (h/sem)	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	15% (5)	3 and 6	A2
	Assignments	2	8% (4)	4,6,7,9	A2 A4
	Projects / Lab.	1	12% (12)	1,2,3,4,5,6,7,8,	A4
	Report	1	5% (5)	11 , 12	A2 A4
Summative assessment	Midterm Exam	3 hr	10% (10)	7,15	A2 A4
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		



Delivery Plan (Weekly Syllabus)

	Material Covered	LOS
Week 1	Junction field-effect transistors (JFET) introduction	A2-1, B1.1, C2-1
Week 2	Operation; background and V-I characteristics: JFET	A2-2, B2.1, C2-3
Week 3	JFET biasing configuration	A2-3, A4-2, C2-1
Week 4	JFET Low frequency incremental model	A2-2, A4-1
Week 5	JFET ac analysis Y parameters, h parameters	A2-1, B1.1, C2-1
Week 6	JFET current source	A2-4, B2.1, C2-3
Week 7	MOSFET definition	A2-3, A4-1, C2-1
Week 8	MID term Examination	A2
Week 9	MOSFET biasing configuration	A2-4, A2-3, A4-1, B2.2
Week 10	MOSFET ac analysis Y parameters, h parameters	A2-4, B1.1, C2-1
Week 11	Multi stage amplifiers	A2-2, B2.1, C2-3
Week 12	Cascading; Ideal impedances, cascading	A2-1, B1.1, C2-1
Week 13	Operational amplifiers; effect of finite open-loop gain	A2-2, B2.1, C2-3
Week 14	Operational amplifiers circuits , inverting, non inverting, summing, differentiating	A2-3, A4-2, C2-1
Week 15	Frequency response, gain-bandwidth product, output voltage swing, saturation	A2-2, A3-1

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered	LOS
Week 1	JFET I-V characteristics	A4
Week 2	JFET small signal amplifier	A4
Week 3	JFET frequency response	A4
Week 4	MOSFET characteristics	A4
Week 5	MOSFET Negative Feedback	A4
Week 6	Op-Amp Circuits; inverting, non-inverting	A4
Week 7	Op-Amp Circuits; summing differentiating	A4



Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Electronic Devices and Circuit Theory Robert L Boylestad Louis Nashelsky Pearson 11th Edition, 2015	Yes
Recommended Texts	Electronic Devices and Circuits Millman and Halkias Mc Graw Hill 4th Edition, 2015.	No
Websites	https://eng.alayen.edu.iq/colleges/e/42	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جند جدا	80 – 89	Above average with some errors
	C - Good	جند	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	راسب (فقد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks 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.

