



Ministry of Higher Education and
Scientific Research - Iraq
Al-Mustaqbal University
College for engineering and technology
Department of Biomedical Engineering



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	BIO-MEDICAL CIRCUITS AND ELECTRONICS	Module Delivery	
Module Type	CORE	. Theory . Lecture . Tutorial .	
Module Code	UOMU0101066		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGx1 UGIII	Semester of Delivery	6
Administering Department	BME	College	Engineering
Module Leader	Dr. Hussam Jawad Kadhim	e-mail	Hussam.jawad@uomus.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval		Version Number	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	UOMU0101052	Semester	5
Co-requisites module	None	Semester	None

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This course is the second of two courses that cope with electronic devices in analog and digital circuits for biomedical circuits. The topics include differential amplifiers, and the characteristics and applications of operational amplifiers (Op-Amps). The course also discusses the design features and operation principles of special-purpose amplifiers, in addition to selected topics on linear digital integrated circuits as well as feedback and oscillator circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none">1. FETs and BJTs-based Differential Amplifiers2. Acquire knowledge on DC and AC analysis of operational amplifiers and switching transistors.3. Practice on the design and operation of feedback and oscillator electronic circuit configurations.4. Validate equivalent circuit models of electronic devices for various applications.5- 555 Timer -based Multivibrators circuits.6. Understand the basic principles of frequency response analysis of electronic devices and active filters design.7. Design, analyze and interpret experiments on electronic amplifiers and integrated circuits.8. Demonstrate the capacity to function in multi-disciplinary teams in Lab and class discussions.
Indicative Contents المحتويات الإرشادية	<ul style="list-style-type: none">-Differential amplifiers: The differential pair of BJT and MOSFET, Analysis and input and output characteristics, DC analysis of a differential amplifier, AC analysis of a differential amplifier. • Common mode rejection ratio (CMRR), Speed of response, and Active load differential pair-The operational amplifier: integrators, differentiators, application to CMOS and BiMOS circuits, Active Filters: basic filter response and characteristics (low pass, high pass, band pass, and band stop)-The Oscillator and its feedback, oscillators with RC and LC feedback circuits-555 Timer-based Multivibrators (A stable, Monostable, and Bistable circuits).-Power Amplifiers: class (A, B, AB, and C)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	3, 6	LO #2, and 5
	Assignments	2	10% (10)	4, 12	LO # 1- 7
	Projects	2	10% (10)	Continuous	
	Report	0	10% (0)		
Summative assessment	Midterm Exam	2 hr	20% (20)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	Review of the main topics in Electronics II Differential amplifiers.
Week 2	Differential amplifiers for Biomedical applications.
Week 3	Applications of Op-Amp's circuits.
Week 4	Applications of Op-Amp's circuits for Biomedical applications.
Week 5	Active filter design for Biomedical applications.
Week 6	Active filter design.
Week 7	Med term exam.
Week 8	Feedback Amplifiers : Basic concepts of feedback -Properties of negative feedback – voltage / current, series, Shunt feedback – Positive feedback.
Week 9	Feedback Amplifiers: Basic concept of regulators.

Week 10	Oscillator circuits : Condition for oscillations – phase shift – Wien bridge, Hartley, Colpitts, Clapp and Crystal oscillators.
Week 11	555 Timer-based multivibrators. (Astable circuit design) for Biomedical applications.
Week 12	555 Timer-based multivibrators. (Bistable & Monostable Circuit design).
Week 13	Power Amplifiers (class A) for Biomedical applications.
Week 14	Power Amplifiers (class B, and AB) for Biomedical applications.
Week 15	Power Amplifiers (class C).
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1,2	
Week 3,4	
Week 5,6	
Week 7,8	
Week 9,10	
Week 11,12	
Week 13,14	
Week 15,16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	R. L. Boylestad and L. Nashelsky, Electronic devices and circuit theory, 11th Edition, Pearson Education, 2013. ISBN: 9780132622264	Yes
Recommended Texts		No

	Sedra and Smith, "Microelectronic circuits", Oxford University Press, 7th Edition, 2014.	
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:				
<p>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.</p>				



