MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Medical Electronic Systems**	**Module Delivery**	
Module Type	**Core**	☒Theory	
Module Code	**MIET3202**	☒Lecture	
ECTS Credits	**6**	☒Lab	
SWL (hr/sem)	**150**	☐ Tutorial ☐ Practical ☐ Seminar	
Module Level	UGIII	**Semester of Delivery**	6
Administering Department	MIET	**College**	EECT
Module Leader	MSc. Rusul Mohsen Hashem	**e-mail**	rusul.mohsen.hashem@uomus.edu.iq
Module Leader's Acad. Title	Asst. Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	MSc. Rusul Mohsen Hashem	**e-mail**	rusul.mohsen.hashem@uomus.edu.iq
Scientific Committee Approval Date	8/11/2023	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electronic circuits II	**Semester**	UGII-S4
Co-requisites module	None	**Semester**	

	Module Aims, Learning Outcomes and Indicative Contents
	أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To provide students with an understanding of electronic systems and their applications in the medical field. 2. To develop students' knowledge and skills in designing, analyzing, and troubleshooting electronic circuits used in medical devices. 3. To familiarize students with the principles and operation of regulated power supplies, switching regulators, clippers, clampers, voltage multiplier circuits, and their practical applications in medical electronic systems. 4. To enhance students' ability to apply theoretical knowledge to practical scenarios and develop critical thinking skills in the context of medical electronics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate a comprehensive understanding of electronic systems and their relevance in the medical field. 2. Design and analyze regulated power supplies, switching regulators, clippers, clampers. 3. Design and analyze voltage multiplier circuits used in medical electronic systems. 4. Explain the principles and operation of regulated power supplies, switching regulators, clippers, clampers, and voltage multiplier circuits. 5. Apply theoretical knowledge to solve problems and troubleshoot electronic circuits used in medical devices. 6. Evaluate the suitability of different electronic circuits for specific medical applications. 7. Critically analyze and interpret data obtained from electronic measurements in medical electronic systems. 8. Communicate effectively and professionally about medical electronic systems, both orally and in writing. 9. Understand analog-to-digital conversion (ADC) 10. Grasp digital-to-analog conversion (DAC)
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A: Regulated power supplies (Rectification) (20hrs)</u> • Introduction to medical electronic systems • Half-wave and full-wave rectification • Understanding diodes and their characteristics

	- Rectifier circuits and waveforms - Capacitor filtering and its role in power supplies - Ripple factor and its significance in regulated power supplies - Calculation of filter capacitance - Design considerations for capacitor filters in medical devices - Linear voltage regulators and their operation - Zener diode regulators - IC regulators <u>Part B: Clippers & Clampers (20hrs)</u> - Introduction to clippers and their role in signal conditioning - Diode clippers and their characteristics - Design considerations for clipping circuits - Applications of clippers in medical electronic systems - Positive and negative clampers - Design and analysis of clamping circuits - Use cases and limitations of clampers in medical devices. <u>Part C: Operational Amplifiers (Op-Amps) (20hrs)</u> - Introduction to operational amplifiers and their applications in medical electronic systems - Op-Amp characteristics and ideal behavior - Practical applications <u>Part D: Filters (LPF, HPF, PBF and PSF) (10hrs)</u>

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	- Active Learning: Engage students through hands-on experiments, discussions, and problem-solving activities. - Practical Applications: Connect theoretical knowledge to real-world medical devices and systems. - Hands-on Experiments: Provide laboratory experiences to reinforce theoretical knowledge and develop practical skills. - Technology Integration: Utilize simulation software and virtual labs for circuit analysis and design. - Continuous Feedback: Provide regular feedback to support student progress and understanding.

<table>
<tr><td colspan="4" align="center">**Student Workload (SWL)**
الحمل الدراسي للطالب</td></tr>
<tr><td>**Structured SWL (h/sem)**
الحمل الدرا يس المنتظم للطالب خلال الفصل</td><td>79</td><td>**Structured SWL (h/w)**
الحمل الدرا يس المنتظم للطالب أسبوعيا</td><td>5</td></tr>
<tr><td>**Unstructured SWL (h/sem)**
الحمل الدرا يس غ ري المنتظم للطالب خلال الفصل</td><td>71</td><td>**Unstructured SWL (h/w)**
الحمل الدرا يس غ ري المنتظم للطالب أسبوعيا</td><td>5</td></tr>
<tr><td>**Total SWL (h/sem)**
الحمل الدرا يس الك يل للطالب خلال الفصل</td><td>150</td><td></td><td></td></tr>
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<tr><td colspan="6" align="center">**Module Evaluation**
تقييم المادة الدراسية</td></tr>
<tr><td colspan="2"></td><td>Time/Number</td><td>Weight (Marks)</td><td>Week Due</td><td>Relevant Learning Outcome</td></tr>
<tr><td rowspan="4">**Formative assessment**</td><td>**Quizzes**</td><td>2</td><td>10% (10)</td><td>5, 10</td><td>LO #1, 2, 10 and 10</td></tr>
<tr><td>**Assignments**</td><td>2</td><td>10% (10)</td><td>2, 12</td><td>LO # 3, 4, 6 and 7</td></tr>
<tr><td>**Projects / Lab.**</td><td>8</td><td>15% (10)</td><td>Continuous</td><td></td></tr>
<tr><td>**Report**</td><td>1</td><td>5% (10)</td><td>13</td><td>LO # 5, 8 and 10</td></tr>
<tr><td rowspan="2">**Summative assessment**</td><td>**Midterm Exam**</td><td>2 hr</td><td>10% (10)</td><td>7</td><td>LO # 1-7</td></tr>
<tr><td>**Final Exam**</td><td>4hr</td><td>50% (50)</td><td>16</td><td>All</td></tr>
<tr><td colspan="2">**Total assessment**</td><td></td><td>100% (100 Marks)</td><td></td><td></td></tr>
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<tr><td colspan="2" align="center">**Delivery Plan (Weekly Syllabus)**
المنهاج الاسبو بع النظري</td></tr>
<tr><td></td><td>**Material Covered**</td></tr>
<tr><td>**Week 1**</td><td>Introduction to medical electronic systems</td></tr>
<tr><td>**Week 2**</td><td>Regulated power supplies (Rectification)</td></tr>
<tr><td>**Week 3**</td><td>Regulated power supplies (Filtration)</td></tr>
<tr><td>**Week 4**</td><td>Regulated power supplies (Regulation)</td></tr>
<tr><td>**Week 5**</td><td>Clippers</td></tr>
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Week 6	Clampers Operations amplifiers OP-AMP applications
Week 7	Mid-Exam
Week 8	OP-AMP applications
Week 9	Active filters (LPF and HPF)
Week 10	Active filters (BPF and BSF)
Week 11	Passive filters (LPF and HPF)
Week 12	Passive filters (BPF and BSF)
Week 13	Analog to digital conversion (ADC)
Week 14	Digital to analog conversion (DAC)
Week 15	Practical applications Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to Multism
Week 2	Half-wave rectifier circuits
Week 3	full-wave rectifier circuits
Week 4	Designing capacitor filters for power supplies
Week 5	Building and testing voltage regulation circuits (Zener stages)
Week 6	Building and testing voltage regulation circuits (IC Regulators)
Week 7	Implementing and testing diode clipping circuits (negative and positive clippers)
Week 8	Implementing and testing diode clipping circuits (Full-wave Clippers)
Week 9	Designing and evaluating clamping circuits
Week 10	Constructing and testing operational amplifier circuits (Inverting and non-Inverting Op-Amp)
Week 11	Constructing and testing operational amplifier circuits (Comparator Op-Amp)
Week 12	Constructing and testing operational amplifier circuits (Integrator and Differentiator)
Week 13	Filters (LPF and HPF)
Week 14	Filters (PBF and PSF)

Learning and Teaching Resources

	Text	Available in the Library?
مصادر التعلم والتدريس		
Required Texts	Electronic Devices and Circuits Theory (Eleventh Edition) by Robert L. Boylestad and Louis Nashelsky	Yes
Recommended Texts		No
Websites	https://www.youtube.com/@aliabdulelahal-naji3192	

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**	راسب (قيد 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.