

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Analog Communications		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CET2204			
ECTS Credits	5			
SWL (hr/sem)	150			
Module Level	2	Semester of Delivery		4
Administering Department	CET	College	EETC	
Module Leader	Hamood Shehab Hamid		e-mail	drhamood@mtu.edu.iq
Module Leader's Acad. Title	ASSt.Professor		Module Leader's Qualification	Ph.D.
Module Tutor	Dr. Maryam Khalifa Abboud		e-mail	Maryam.khalifa@mtu.edu.iq
Peer Reviewer Name	Alhamzah Taher Mohammed		e-mail	alhamza_tm@mtu.edu.iq
Scientific Committee Approval Date	13/06/2023		Version Number	1.0
Relation with other Modules				
العلاقة مع المواد الدراسية الأخرى				
Prerequisite module	CET2105		Semester	3
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. Understanding the modulation and de-modulation 2. Viewing and knowledge Amplitude modulation and Frequency modulation. 3. Analyzing the advantage and disadvantage of AM over FM. 4. Analyzing the generation and detection each of AM and FM. 5. To develop problem solving skills and understanding of PM equations
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize Basic Principles of modulation and de-modulation 2. Explain the Need for Modulation. 3. Define a Carrier Wave, Radio Frequency Spectrum, Sound and Radio Broadcasting 4. Identify Amplitude Modulation, Percent Modulation, Upper and Lower Sidebands 5. Explain Methods of Modulation. 6. Mathematical Analysis of a Modulated Carrier Wave 7. Discuss forms of Amplitude Modulation and Methods of Amplitude Modulation. 8. Describe the Power Relation in an AM Wave. 9. Identify modulating Amplifier Circuit: AM- Transmitter & Radio Receiver Essential Parameter 10. Explain the AM generation of SSB, DSB-SC balanced modulators (Cowan & Ring). 11. Summarize various demodulation type of AM Signal: AM-Detector (Envelope & Synchronous) 12. Identify the Frequency Modulation Process: Modulation Index, Deviation Ratio, Percent Modulation and FM Sidebands. 13. Discuss the relationship between the modulation index and number of sidebands. 14. List the various types of generation of FM (the direct method and indirect method) & demodulation or detection. 15. Identify the comparison between AM and FM. 16. Discuss Principles of FM Receiver: FM Discriminator (Foster –Seeley & Ratio Detector). 17. Explain the Phase modulation (PM) Definition. 18. Discuss the PM equation and PM wave forms
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A –MODULATION AND DEMODULATION: Need for Modulation,. Define a Carrier Wave, Radio Frequency Spectrum, Sound and Radio

	Broadcasting. (20 hr) Part B- Amplitude Modulation: Percent Modulation, Upper and Lower Sidebands, Methods of Modulation, Mathematical Analysis of a Modulated Carrier Wave, forms of Amplitude Modulation and Methods of Amplitude Modulation, Power Relation in an AM Wave,. Identify modulating Amplifier Circuit: AM- Transmitter & Radio Receiver Essential Parameter, The AM generation of SSB, DSB-SC balanced modulators (Cowan & Ring), demodulation type of AM Signal: AM-Detector (Envelope & Synchronous) (30hr) Part C Frequency Modulation Process: Modulation Index, Deviation Ratio, Percent Modulation and FM Sidebands, the relationship between the modulation index and number of sidebands, generation of FM (the direct method and indirect method) & demodulation or detection, the comparison between AM and FM, FM Receiver :FM Discriminator (Foster-Seeley & Ratio Detector), the Phase modulation (PM) Definition and the PM equation and PM wave forms.(24 hr)
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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	74	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	76	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	6.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1-6 , LO #6-11
	Assignments	2	10% (10)	2, 12	LO # 1-12
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 1-14
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	MODULATION AND DEMODULATION: Forms of Amplitude Modulation , Methods of Amplitude Modulation
Week 2	Carrier Wave, Radio Frequency Spectrum, Sound, Radio Broadcasting
Week 3	Need for Modulation,
Week 4	Methods of Modulation:
Week 5	Amplitude Modulation Percent Modulation, Upper and Lower Sidebands,
Week 6	Mathematical Analysis of a Modulated Carrier Wave
Week 7	Power Relation in an AM Wave,
Week 8	Modulating Amplifier Circuit: AM- Transmitter
Week 9	Radio Receiver Essential Parameter
Week 10	Generation of SSB, DSB-SC Balanced Modulators :(Cowan & Ring) Demodulation of AM Signal: AM-Detector (Envelope & Synchronous
Week 11	Frequency Modulation: Modulation Index, Deviation Ratio , Percent Modulation, FM Side bands FM Receiver :FM Discriminator (Foster –Seeley &Ratio Detector),
Week 12	Modulation Index and Number of Side bands, Demodulation or Detection, Comparison between AM and FM, The Four Fields of FM
Week 13	FM Generation (Direct& Indirect Method)
Week 14	Phase modulation (PM) Definition
Week 15	PM equation and PM wave forms
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Methods of Modulation Process and why modulation
Week 2	Lab2: Demodulation methods Process and detection.
Week 3	Lab 3:Methods of Amplitude Modulation
Week 4	Lab4: Calculating the time and a frequency of carrier wave
Week 5	Lab 5: Calculating of Index Modulation AM and Percent Modulation.
Week 6	Lab 6:Calculating of Upper and Lower Side bands frequencies of AM
Week 7	Lab 7: Modulation AM wave.
Week 8	Lab 8:Calculating power content of AM
Week 9	Lab 9: DE-modulation wave of AM
Week 10	Lab 10:Frequency modulation Process
Week 11	Lab 11:Calculating the maximum and minimum frequency
Week 12	Lab 12: Calculating carrier frequency of FM
Week 13	Lab 13: Index Modulation and Percent Modulation of FM
Week 14	Lab 14: Modulation wave of FM
Week 15	Lab 15: De-Modulation wave of FM

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Principles of Communication Systems By J.S.Chitode, First Edition-2007 Modern Digital and Analog Communication Systems ,By B.P.Lathi OXFORD	Yes
Recommended Texts	Analog and Digital Communications, By Schaum Second Edition Data Communications and Networking, By Behrouz A. Forouzan, Fifth Edition	No
Websites		

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.				