

COME574 –Millimeter Wave Integrated Circuit (MMIC) Design

Curricular Area	Electrical Engineering/ Communication Section		
Type of Course	Elective – Major		
Catalogue Description	Introduction to mm-Wave systems and applications. Introduction to MMIC Design: Merits, Limitations and Applications. Types of MMICs. Types of MMICs, Fabrication Techniques and Processes. Passive MMIC Elements: Capacitors, Inductors, Transmission line, Via holes, Power Dividers/Combiners and Couplers. Testing Passive MMIC Elements. Introduction to mmWave active elements.		
Prerequisites by Courses	COME471: Microwave Engineering		
Prerequisites by Topics	Scattering parameters, Power Divider, Couplers		
Instructors	Dr. Hamza Issa Office: Faculty of engineering - Debbieh Email: h.issa@bau.edu.lb Phone: 7985858 - ext: 3403		
Office Hours	M: 14:00-16:00, W: 14:00-16:00		
Load	2 credits; 2 Lecture-sessions/week – 50 min per session. Monday and Wednesday 08:00-08:50. Room: EXB1		
Textbook	<ul style="list-style-type: none"> • A. S. Khan, “Microwave Engineering: Concepts and Fundamentals,” CRC Press Taylor & Francis, 2014. • R. Chatterjee, “Advanced Microwave Engineering, Special Advanced Topics”, Halsted Press: John Wiley & Sons, 1988. 		
Topics	<i>Subjects covered</i>	<i>50 min. lectures Including group work, library work, laboratory work</i>	Week
	Introduction to mm-Wave systems and applications	1, 2	1
	MMIC Design: Merits, Limitations	3	2
	Applications of MMIC	4	2
	Types of MMICs	5	3
	Fabrication Techniques used in MMIC	6	3
	MMIC Processes	7	4
	Passive MMIC Capacitors	8, 9	4 5
	Passive MMIC Inductors	9, 10	5 5
	Passive MMIC Transmission line and Via holes	11, 12	6 6

	Passive MMIC Power Dividers/Combiners,	12, 13	6 7
	Passive MMIC Couplers	13, 14	7 7
	Testing Passive MMIC Elements	15	8
	Introduction to mmWave active elements	16	8
	Research Project	17, 18, 19 (holiday), 20, 21 (holiday), 22, 23, 24, 25, 26	9 to 13
	Project presentation and discussion	27, 28	14
	Final Exam		
	Total	28	14 weeks

At the end of this course, the students should be able to:

ILO	Learning Outcomes	Correlation with	Program Outcomes	Program Objectives
1	Explain the importance of MMIC, Discuss Merits and Limitations of MMIC Designs, Identify and locate applications to MMIC		a	2
2	Discuss Types of MMICs		a	2
3	Describe Fabrication Techniques used in MMIC and Analyze and Sketch different MMIC Processes		a	2
4	Design Passive MMIC devices: Capacitors, Inductors, Transmission Lines, Via holes, Dividers/Combiners and Couplers		c	2
5	Describe the testing procedures of passive MMIC Elements		a	2
6	Compare and judge different passive components realized using different state of art MMIC technologies and Simulate high frequency circuits using modern appropriate software tools		b	5, 3

ILO	Learning Outcomes Assessment Tools	Exams	HWs	Lab Reports	Project	Course Survey
1	Explain the importance of MMIC, Discuss Merits and Limitations of MMIC Designs, Identify and locate applications to MMIC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
2	Discuss Types of MMICs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
3	Describe Fabrication Techniques used in MMIC and Analyze and Sketch different MMIC Processes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
4	Design Passive MMIC devices: Capacitors, Inductors, Transmission Lines, Via holes, Dividers/Combiners and Couplers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
5	Describe the testing procedures of passive MMIC Elements	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
6	Compare and judge different passive components realized using different state of art MMIC technologies and Simulate high frequency circuits using modern appropriate software tools				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Assessment:

3-1 Assessment type

Assessment Methods	Assessment skills	Average weight
Closed-book examinations	knowledge base and intellectual qualities	40%
Assignments submissions (problem set), Projects	intellectual qualities and professional skills	60%
Total	Total	100%

3-2 Assessment Schedule and Weighing

Assessment:	Dates	Weighing
Assignments + presentations	1 st - 8 th Week	20% + 10% = 30%
Research Project	About state of art topics Submission: 14 th week	30%
Final		40%
Total		100%

Attendance:

As set by BAU regulations, and specified in Student Manual, students who miss more than 20% of the sessions of any course excluding the first week of the semester will be withdrawn from the course with and will get a grade of "WF". The first attendance warning is issued after 10% absence. The second sued when the absence percentage becomes 15%. The course is withdrawn when the percentage reaches 20%. The "AW" grade is not taken into account in the calculation of the SGPA.

Course Coordinator	Dr. Hamza Issa
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January 2018