

1.	Name of Course					Microwave Devices and Components				
2.	Course Code					JMDC4522				
	JMDC = the first alphabet identify the faculty within which the subject is offered., JMDC = the remaining three alphabets identify the course that offers the subject, 4522= the first digit identify level of study; in this case undergraduate level, 4522 = the second and third digits identify subject identity and 4522 = the fourth digit identify credit value or credit hours									
3.	Name(s) of academic staff					To be Assigned				
4.	Rationale for the inclusion of the course/module in the programme					Knowledge Microwave Devices and Components are essential in electrical and electronic engineering. Moreover, acquiring knowledge in Microwave Devices and Components enable engineer to design system and appropriate dielectric system.				
5.	Semester and Year offered					Year 3, Semester 2				
6.	Total Student Learning Time (SLT)			Face to Face				Total Guided and Independent Learning		
	L = Lecture T = Tutorial P = Practical IS= Independent Study			L	T	P	IS	Total Guided and Independent Learning = 120		
				42	7	6	65			
7.	Credit Value					3.0				
	Lecture: 3 hours per week x 14 weeks Tutorial: 1 hour per week x 7 weeks Practical: 2 hours x 3 weeks									
8.	Prerequisite (if any)					Electrical circuit I and II				
9.	Course Objectives 1. This course introduces Microwave Devices and Components and application in Electrical engineering. Course Learning Outcomes (CLO) At the end of the semester students should be able to: CLO1: To understand and Apply the RF and Microwave design principles; CLO2: Analyse and design the Microwave and RF Circuits; CLO3: Understand and Apply the fundamental and advanced communication technologies;									
10.	Transferable Skills: This course is expected the development of the following transferable skills: ▪ An ability to manage time and task ▪ An ability to learn both independently and co—operatively; ▪ An ability to take responsibility and carry out laboratory test; ▪ An ability to take initiative and lead other; ▪ An ability to use software where relevant to the subject.									
11.	Teaching-learning and assessment strategy A variety of learning strategies are used throughout the course, including the following • Classroom Lesson; Lecturer and power point presentation • Tutorial session • Student- lecturer Discussion									

	• Collaborative and co-operative learn; • Independent Study. Assessment: <table> <tr> <td>Course works</td><td>40%</td></tr> <tr> <td>Assignment</td><td>5%</td></tr> <tr> <td>Tutorial</td><td>5%</td></tr> <tr> <td>Quizzes</td><td>5%</td></tr> <tr> <td>Laboratory works</td><td>10%</td></tr> <tr> <td>Test</td><td>15%</td></tr> <tr> <td><u>Final Examination</u></td><td><u>60%</u></td></tr> <tr> <td><u>Total</u></td><td><u>100%</u></td></tr> </table>	Course works	40%	Assignment	5%	Tutorial	5%	Quizzes	5%	Laboratory works	10%	Test	15%	<u>Final Examination</u>	<u>60%</u>	<u>Total</u>	<u>100%</u>
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12.	Synopsis: This course is very important course in the field of electronics engineering. The objective of course is to expose students to engineering system development process and to enhance students' skill and capability in understanding microwaves components.																
13.	Mode of Delivery: Lectures; Tutorials; Laboratory works																

14.	Assessment Methods and Types:						
	Performance Criteria :						
	CLO-PLO	Assessment Tool	1	2	3	4	5
	Marks		0-39	40-49	50-59	60-74	75-100
	Grade		(F)	(D,D+)	(C-,C,C+)	(B-,B,B+)	(A-,A,A+)
	CLO1: To understand and Apply the RF and Microwave design principles;	Assignment Tutorials Quizzes Lab works Test Examination	Fail To: -learn both independently and cooperatively -take responsibility and carry out laboratory test	Poor To: -learn both independently and cooperatively -take responsibility and carry out laboratory test	Satisfactory To: -learn both independently and cooperatively -take responsibility and carry out laboratory test	Good To: -learn both independently and cooperatively -take responsibility and carry out laboratory test	Excellent To: -learn both independently and cooperatively -take responsibility and carry out laboratory test
	CLO2: To Analyse and design the Microwave and RF Circuits;	Assignment Tutorials Quizzes Lab work Test Examination	Fail To: -manage time and task -learn both independently and cooperatively -take responsibility and carry out laboratory test	Poor To: -manage time and task -learn both independently and cooperatively -take responsibility and carry out laboratory test	Satisfactory To: -manage time and task -learn both independently and cooperatively -take responsibility and carry out laboratory test	Good To: -manage time and task -learn both independently and cooperatively -take responsibility and carry out laboratory test	Excellent To: -manage time and task -learn both independently and cooperatively -take responsibility and carry out laboratory test
	CLO3: Understand and Apply the fundamental and advanced communication technologies;	Assignment Tutorials Quizzes Lab work Test Examination	Fail To: -manage time and task -learn both independently and cooperatively -take responsibility and carry out laboratory test -take responsibility and carry out laboratory test	Poor To: -manage time and task -learn both independently and cooperatively -take responsibility and carry out laboratory test -take responsibility and carry out laboratory test	Satisfactory To: -manage time and task -learn both independently and cooperatively -take responsibility and carry out laboratory test -take responsibility and carry out laboratory test	Good To: -manage time and task -learn both independently and cooperatively -take responsibility and carry out laboratory test -take responsibility and carry out laboratory test	Excellent To: -manage time and task -learn both independently and cooperatively -take responsibility and carry out laboratory test -take responsibility and carry out laboratory test

15.	Mapping of the Programme Objectives to the Programme Learning Outcomes										
Programme Learning Outcomes (PLO) Programme Objectives (PO)	PLO1: Ability to acquire and apply knowledge of science and engineering fundamentals.	PLO2: Acquired in-depth technical competence in electronics engineering discipline.	PLO3: Ability to undertake problem identification, formulation and solution;	PLO4: Ability to utilise systems approach to design and evaluate operational performance.	PLO5: Understanding of the principles of design for sustainable development;	PLO6: Understanding of professional and ethical responsibilities and commitment to them.	PLO7: Ability to communicate effectively, not only with engineers but also with the community at large.	PLO8: Ability to function effectively as an individual and in a group with the capacity to be a leader or manager;	PLO9: Understanding of the social, cultural, global and environmental responsibilities of a professional engineer	PLO10: Recognising the need to undertake lifelong learning, and possessing/acquiring the capacity to do so	PLO11: Ability become entrepreneur
	✓	✓							✓	✓	

16.

Mapping of the course Learning Outcome to the Programme Outcome											
Course Learning Outcome (CLO)	Programme Learning Outcomes (PLO)										
	PLO1: Ability to acquire and apply knowledge of science and engineering fundamentals.	PLO2: Acquired in-depth technical competence in electronics engineering discipline.	PLO3: Ability to undertake problem identification, formulation and solution;	PLO4: Ability to utilise systems approach to design and evaluate operational performance.	PLO5: Understanding of the principles of design for sustainable development;	PLO6: Understanding of professional and ethical responsibilities and commitment to them.	PLO7: Ability to communicate effectively, not only with engineers but also with the community at large.	PLO8: Ability to function effectively as an individual and in a group with the capacity to be a leader or manager;	PLO9: Understanding of the social, cultural, global and environmental responsibilities of a professional engineer	PLO10: Recognising the need to undertake lifelong learning, and possessing/acquiring the capacity to do so	PLO11: Ability become entrepreneur
	CLO1: To understand and Apply the RF and Microwave design principles;	✓	✓						✓	✓	
	CLO2: To Analyse and design the Microwave and RF Circuits;	✓	✓						✓	✓	
	CLO3: Understand and Apply the fundamental and advanced communication technologies;	✓	✓						✓	✓	

17.	Content outline of the course/module and the SLT per topic						
	Details		SLT (Hour)				
			L	T	P	IS	Total
	Topic 1	Review: Maxwell’s equations and transmission line theory – review.	3	-	-	6	9
	Topic 2	Microwave Network Analysis: Analyse Transmission line equations and solutions - Smith chart, ABCD Matrix, S-Parameter Matrix and Signal Flow Graphs	6	1	-	9	16
	Topic 3	Impedance Transformation and Matching: Impedance Measurements of impedance, Single-Stub Matching, Double stub- matching, Triple-Stub matching, impedance matching with Lumped elements, Waveguide reactive elements, Quarter-wave transformer, Binomial Transformer, Chebyshev Transformer, Tapered Transmission lines	9	2	-	14	25
	Topic 4	Waveguide components: Introduction to Rectangular waveguide, Bends and Twists, Ridge waveguide, Fin Line, Terminations, Attenuators, Phase Shifters, Circular Polarizers, Directional Couplers, Hybrid Junctions, Ferrites, Faraday Rotations, Isolators, Circulators, Cavity Resonators, Coaxia-to-waveguide Transitions, Rotary Joints and Switches.	9	1	-	14	24
	Topic 5	Coaxial Components: Two-wire line, Coaxial cables, Terminations, Connectors and Transitions, Attenuators, Phase Shifters and Baluns	6	1	-	9	16
	Topic6	Stripline Circuits: Introduction to Substrate Materials, Stripline, Coupled Stripline, Microstrip, Coupled Microstrip, Coplanar stripline, Terminations, Attenuators, Coupled, Power dividers, Circulators and Isolators, Resonators, Lowpass Filters, Bandstop Filters, Bandpass Filters and Wideband Filters,	9	2	-	13	24
	practical	1. Comparison of different materials dielectric 2. Impedance measurement 3. Wire Terminations	-	-	6	-	6
	Total SLT (Hour)		42	7	6	65	120

18.	Main references supporting the course 1. David M. Pozar, “ Microwave Engineering”, 3 rd Edition, Wiley, 2009 Additional references supporting the course
19.	Other additional information All materials will be available to the students in the library.