



**Arab Academy for Science & Technology and Maritime Transport**  
**College of Engineering & Technology**  
**Department of Electronics and Communications Engineering**  
**Cairo Campus**



**EC546      Microwave Technology      S/F' 2011**  
**Course Outline**

<b>Instructor</b>	<b>Professor Dr. Atef Ghoniem</b>
<b>E-mail</b>	
<b>Office</b>	
<b>Class Room</b>	<b>Mon. (10:00 – 12:30) – Tue. (10:30 – 12:30)</b>
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<b>Objective</b>	<i>After completing this course:</i> the student should be able to analyze and design microwave passive device and active devices, and be acquainted with the design of other topics that are highly demanded in the field of RF/microwave circuits
<b>Text Book (T.B)</b>	<b>David M. Pozar, Microwave Engineering, 3rd Ed. Wiley, 2005</b>
<b>Reference Book(R.B)</b>	Guillermo Gonzalez, Microwave Transistor Amplifiers – Analysis and Design. 2nd Edition, Prentice Hall, 1984.
<b>Grading</b>	<p><b>7<sup>th</sup> Week (30%):</b>          ✓Exam-1 25%          ✓Quiz-1 and assignment-1 5%</p> <p><b>12<sup>th</sup> Week (20%):</b>          ✓Exam-2 15%          ✓Quiz -2 and assignment-2 5%</p> <p><b><u>Attendance and Project (10%)</u></b></p> <p><b>Final Exam (40%)</b></p>

<b>Week No.</b>		<b>Course Outline</b>	
1	4 <sup>th</sup> Oct.	Lecture	<i>Course introduction:</i> Course topics - Microwave bands - Microwave applications
		Tutorial	Review of lossless transmission line basic equations and TEM-wave concept
2	11 <sup>th</sup> Oct.	Lecture	<i>Microwave network Analysis:</i> Impedance- Admittance - Scattering – ABCD matrices formulation and inter-transformation ( <b>Ch.4</b> )
		Tutorial	Dem on network analyzer to show the students how to measure the scattering matrix of microwave network, and Problems on <i>Microwave network Analysis</i> ( <b>Sheet No.1:</b> 4.7, 9, 10, 12, 13, 16)
3	18 <sup>th</sup> Oct.	Lecture	<i>Impedance matching Network:</i> Single stub shunt and series - Quarter-wave transformer - Multi-section transformer ( <b>Ch.5</b> )
		Tutorial	Problems on <i>Microwave network Analysis</i> ( <b>Sheet No.1:</b> 4.17, 18, 19, 24, 25, 28 & 29)
4	25 <sup>th</sup> Oct.	Lecture	Binomial and Chebyshev Impedance transformers ( <b>Ch.5</b> )

		Tutorial	Problems on <i>Impedance matching Network</i> ( <b>Sheet No.2</b> : 5.1, 2, 3, 4, 5, 6, 7, 9)
<u>5</u>	1 <sup>st</sup> Nov	Lecture	<i>Microwave passive components</i> : three and four port networks – waveguide power divider – waveguide T-junction – Both hole Directional coupler ( <b>Ch.7</b> )
	<b>Quiz#1</b> <b>assign#1</b>	Tutorial	<b>CAD tool</b> : demo for microwave circuit simulation and analysis, and Problems on <i>Impedance matching Network</i> ( <b>Sheet No.2</b> : 5.10, 12, 13, 14, 16, 20, 21)
6	8 <sup>th</sup> Nov.	Lecture	Theory of coupled lines – microstrip power divider – microstrip directional coupler ( <b>Ch.7</b> )
		Tutorial	Problems on <i>Microwave passive components</i> ( <b>Sheet No.3</b> : 7.2, 3, 4, 5, 6, 7, 11, 12, 18, 19, 20, 21, 22)
7	<i>7th week exam</i>		
8	22 <sup>th</sup> Nov.	Lecture	Microwave filter design using <i>Insertion loss method</i> (Maximally flat filter and Equal ripple filters) <b>Ch.8</b>
		Tutorial	Problems on microwave filters ( <b>Sheet No. 4</b> : 8.8, 9,10, 11, 12, 13, 14)
9	29 <sup>th</sup> Nov.	Lecture	Microwave filter implementation using microstrip Lines <b>Ch.8</b>
		Tutorial	Problems and CAD tool demo on microwave filters implementation
<u>10</u>	6 <sup>th</sup> Dec.	Lecture	<i>Microwave amplifiers</i> : Definitions – Characteristics – power gains – Stability <b>Ch.11</b>
	<b>Quiz#2</b> <b>assign#2</b>	Tutorial	CAD tool demo on microwave amplifiers, and Problems on microwave amplifiers ( <b>Sheet No. 5</b> : 11.1, 2, 3, 4, 5)
11	13 <sup>th</sup> Dec.	Lecture	<i>Microwave amplifier design</i> : Design for maximum gain - Design for specific gain <b>Ch.11</b>
		Tutorial	Problems on microwave amplifiers ( <b>Sheet No. 5</b> : 11.6, 8, 9, 10, 13, 14)
12	<i>12th week exam</i>		
13	27 <sup>th</sup> Dec.	Lecture	Low noise microwave amplifier design and introduction to microwave oscillators and mixers <b>Ch.11 &amp; 12</b>
		Tutorial	CAD tool demo on microwave amplifiers implementation
14	3 <sup>rd</sup> Jan.	Lecture	Microwave oscillators using BJT: <b>Ch.12</b>
		Tutorial	Problems and CAD tool demo on microwave oscillators ( <b>Sheet No. 6</b> : 12.3, 4, 7)
15	10 <sup>th</sup> Jan.	Lecture	Microwave mixers using BJT: <b>Ch.12</b>
		Tutorial	Problems on microwave mixers ( <b>Sheet No. 6</b> : 12.18, 19)
<b>16</b>	<b>Revision</b>		
<i>Good Luck</i>			