COURSE PROFILE

<table>
<tr><td>Course Number : EE462</td><td>Course Title :
Microwave Measurement Techniques and Lab.(Mikrodalga Ölçüm Teknikleri ve Lab.)</td></tr>
<tr><td>Required / Elective : Elective</td><td>Pre-requisite : EE461,
(All topics in Microwave Engineering)</td></tr>
<tr><td>Catalog Description:
Fundamental measurement techniques at microwave frequencies: power, frequency and impedance measurements. Noise in microwave circuits and noise figure measurements. Sources, detectors and mixers. S-parameters measurement and network analyzers. Microwave antennas and propagation measurements. Computer aided design and simulation tools for microwave circuits. Laboratory experiments: Power, frequency, impedance, attenuation, reflection, SWR and S-parameters measurements, impedance matching, antennas and propagation.</td><td>Textbook / Required Material :
“Microwave Engineering”, 3rd Ed., David M. Pozar, John Wiley & Sons, 2005
Lab Handouts, Lab-volt microwave set experiment handbook</td></tr>
<tr><td colspan="2">Course Structure / Schedule : (2+0+2) 3 / 6 ECTS</td></tr>
<tr><td colspan="2">Extended Description :
Measurement techniques at microwave frequencies: power, frequency and impedance measurements.
Noise sources, noise temperaure and noise figure analysis and measurements. Microwave sources, detectors and mixers, characterization and measurement.
S-parameters measurement setups, network analyzer principles.
Microwave antennas and propagation basics. Transmission and reflection measurements. Computer aided design and simulation tools for microwave circuits.
Laboratory experiments: Power, frequency, impedance, attenuation, reflection, SWR and S-parameters measurements, impedance matching, antennas and propagation.</td></tr>
<tr><td>Design content :
Use of CAD tools for design based simulation work.</td><td>Computer usage:
Matlab based simulation and analysis of microwave circuits.</td></tr>
<tr><td colspan="2">Course Outcomes: [relevant program outcomes in brackets]:
a) An ability to apply fundamental math and science knowledge to the characterization, modelling, analysis and measurement of microwave frequency applications [2]
b) A through understanding of relative measurement techniques and measurement error characterization in transmission line systems and high frequency electronics [2],[5]
c) An ability to identify, measure and evaluate high frequency communication sub-sytems in a multidisciplinary frame.[3],[6],[10]
d) An ability to use high frequency analysis, simulation and measurement techniques and CAD tools [11].
e) An ability to analyze, test and evaluate the measurement data for various microwave circuits (matching networks, power dividers, couplers, hybrids, filters amplifiers) [5],[6],[7]</td></tr>
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f) An ability to use microwave measurement equipment efficiently and setup experiments,[5]
g) An ability to work as a team and communicate effectively [9]

Level of Contribution of Course to Program Outcomes:
Strong: [5],[8],[9],
Average: [2],[6], [11]
Some : [3],[7],[10]

Recommended reading:

"RF Circuit Design", Theory and Applications, R. Ludwig and P. Bretchko, Prentice Hall

Teaching Methods:

Pre-readings, lectures, Lab experiments, Lab Project, Team work,

Assessment Methods: [Related to course outcomes]

Lab reports, Midterm/quiz exams, Final exam, Experimental work [a,b,d,e,f,g]

Project Presentations, Class survey, [b,c,d,e,f,g]

Student Workload:

Preparatory reading	45 hrs
Lectures	28 hrs
Homework	10 hrs
Lab	28 hrs
Project	32 hrs
Presentation	1 hrs
Midterm/Quiz Exams	4 hrs
Final Exam	2 hrs

TOTAL …… 150 hrs … to match 25 x 6 ECTS

Prepared by : Prof..Dr. Ahmet Aksen	Revision Date : 02.02.2010