RF Electronics
ECE-E 472

Lecture: Tuesdays and Thursdays 11:00 AM 12:30 PM
Room Alumni Engineering Lab 279
Laboratories: Fridays 11:00 AM to 12:30 PM and 1:00 to 3:00 PM
CAD Lab. Room and Experimental Lab. TBA

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Text: Lectures and handout

References:
- Radio Frequency and Microwave Electronics by Mathew Radmanesh, (Prentice Hall)
- Microwave Engineering by David M. Pozar (Addison Wesley)
- RF Circuit Design Theory and Applications by Ludwig and Bretchko, (Prentice Hall)
- Microwave Circuit Design Using Linear and Nonlinear Techniques by Vandelin, Pavio and Rohde (Wiley)
- Foundations of Microwave Engineering by R.E. Collin, 2nd edition
  (McGraw-Hill)
- Microwave Transistor Amplifiers Analysis and Design by G. Gonzalez
  (Prentice Hall)
- Microwave Solid State Circuit Design by Bahl and Bhartia (Wiley)

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<th>Week</th>
<th>Subject</th>
<th>Laboratory</th>
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<tr>
<td>1</td>
<td>Final Exam review</td>
<td>No Lab</td>
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<tr>
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<td>Review of diodes and transistors</td>
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<td>Biasing and small-signal gain</td>
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<td>2</td>
<td>Resonant Circuits</td>
<td>CAD Lab on Transistor</td>
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<td>DC Return and Blocks</td>
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<td>Narrow band Filters (LP, BS, BP)</td>
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<td>3</td>
<td>Insertion loss Filter Design</td>
<td>CAD Lab on Filters</td>
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<td>Richard’s Transformation &amp; Kuroda’s identities</td>
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<td>Commensurate- and coupled-line filter</td>
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<td>Week</td>
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| 4    | RF Control Circuits  
Switches  
Phase Shifters | Exp. #1 |
| 5    | Amplifiers design  
Gain and Stability circles | CAD Lab on  
Switches |
| 6    | Amplifier design  
Noise analysis and Noise circles | CAD Lab on  
Phase shifters |
| 7    | Small-signal Amplifiers  
Multi-stage amplifiers  
High-Power Amplifier Design  
Linearity and dynamic range | Exp. # 2 |
| 8    | Oscillators  
Fixed and frequency Tuned Osc.  
Noise in Oscillators (Leeson’s Model) | CAD Lab on  
LNA |
| 9    | Frequency Conversion  
Detector  
Single and balanced mixers | Exp. # 3 |
| 10   | Review | Make-up Lab |

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<th>Exp. #</th>
<th>Topic</th>
<th>Experimental Laboratory</th>
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| 1      | Filters | Return and Insertion loss  
Group delay |
| 2      | Switches and Phase shifter | Isolation and Insertion loss  
Dispersive vs non-dispersive phase shifter |
| 3      | Amplifiers | Gain, VSWR, Linearity, and Noise |

Grading Policy for each Laboratory Report:
Objective and Experimental Set-up 2%
Theory of Operation 10%
Data Collections, Display and Analysis 43%
Answers to Questions & HW problems 43%
Conclusions 2%

Laboratory reports are due one week after conducting the experiments. Please follow all the report writing standards and style.

Grading Policy:  
Weekly Quizzes (6 best) 30%
Laboratory & HW 40%
Final 30%