# Course Content

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| Course Title (English) | Power Amplifier Design for Wireless Communications |
| Course Title (Chinese) | 無線通訊功率放大器設計 |
| Credit | 3 |
| Instructor | Prof. Tian-Wei Huang 黃天偉 教授 |
| Outline | 1. Linear power amplifiers<br>Class A amplifiers, Gain match and power match, Load-Pull, Loadline theory, Design examples.<br>2. High-efficiency amplifiers<br>Class AB/B/C/D/E/F amplifiers, PAE, “Knee” effect, Power matching, Overdrive,<br>3. Non-linear effects in RF PA<br>Two-Tone analysis, P1dB/IP3/IM3, AM-to-PM effects.<br>4. PA for broadband communication<br>Digital modulation, GSM/CDMA/OFDM, Peak-to-average ratio, CCDF, EVM, BER.<br>5. PA Layout and simulation<br>Design flow chart, Device selection, layout, Large-signal simulation, ADS DesignGuide.<br>6. Efficiency enhancement<br>The Doherty amplifier, Bias adaption, EER, The LINC outphasing technique.<br>7. Linearization techniques<br>Envelope feedback, RF Predistortion, Digital Predistortion, Feedforward, |

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| | 8. PA architecture<br>Push-Pull amplifiers, Balanced amplifiers, Power combining, Interstage PA design, PA stability<br>9. High-Yield amplifier design<br>Statistical design process, Yield analysis, Sensitivity analysis, High-Yield design examples.<br>10. 802 standard and link design<br>IEEE 802 standard conference simulation, link budget design, 60-GHz WLAN/WPAN, system parameters calculation (noise figure, IP3, phase noise) |
| Goal | 1. Understand power amplifier industry terminology and design procedure<br>2. Hardware oriented communication system introduction |
| English Teaching | ■ YES ☐ NO |
| Teaching Material | ■ English ☐ Chinese |