Course Prefix & Title
EEE 598 RF Transmitters and Amplifiers

Prerequisites:
- EEE 433/591 Analog Integrated Circuits
- EEE 445/591 Microwave Engineering
- EEE 524 RF Communications Transceiver Design

Description:
Design principles of RF power amplifier circuits and transmitter architectures with emphasis on wireless applications. Class A, B, A/B, C, F, J, continuous BJ, switch mode, Doherty and supply modulation architectures. Load pull and high-power packaged devices/PAs.

Course Overview
This course covers design and operating principles of Radio Frequency (RF) power amplifiers (PAs) and transmitters with emphasis to wireless mobile and infrastructure systems. Specifically, this course teaches fundamental and advanced techniques in linear power amplification, design and analysis. Students will learn PA operating principles, and utilize widely adopted engineering tools / principles to design, analyze, estimate performance, and relate fundamental semiconductor device characteristics to PA / transmitter performance metrics.

Course Topics
- Overview of Transmitters/Power Amplifiers for Wireless Networks
- RF Impedance Matching Techniques
- Key Figures of Merit (FOM) for PAs
- 1st Order Principles of Transistor Operation in PAs
- PA Biasing & Stability Considerations
- Class A Power Amplification
- Class B and A/B Power Amplification
- Class C Power Amplification
- Introduction to Switching Mode Power Amplification
- Class F (and inverse F) Power Amplification
- Introduction to Class-J and Continuous Mode PAs
- Load Pull & High Power Packaged Devices
- Doherty PA Architecture
- Introduction to Supply Modulation PA Architectures

Assignments:
The course will assign 6 to 8 projects which are closely linked to topical concepts developed during lecture periods. Projects relate to application, design concepts, principles and methodologies, circuit and transmitter analysis techniques. Completion of projects requires use of engineering tools, including MatLab and Keysight’s Advanced Design System. Tool access will be available through ASU’s and/or by downloading (for academic purposes) onto a student’s PC.
The course will include a mid-term and final exam. Grading is based on weighted projects and exams.