

## **Miniaturization and Material Design Methods for Antennas**

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This short course will cover several topics relating to small antennas for narrowband and ultrawideband applications. Particular emphasis will be on the use and integration of materials (ceramics, polymers, textures and mixtures of these), inductive and capacitive loading using lumped or distributed RF circuits for achieving specific gain, bandwidth and size objectives. Design approaches and guidelines will be described in pursuing small antenna design using material and circuit combinations. Both, narrowband and ultrawideband elements will be considered. Among them will be miniature spirals (from VHF and higher), GPS, SATCOM as well as printed antenna and array designs on textured dielectrics. In addition, pertinent analysis methods, optimizations and small antenna performance limits will be described.