## Short course (half-day): Planar Antennas for Wireless Communications and Their Recent Advances

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**Course Syllabus:** Planar antennas, including microstrip and printed antennas, metal-plate antennas, ceramic chip and dielectric resonator antennas, are generally flat in appearance and have a low profile. Such planar antennas have recently found extensive applications in WWAN (such as 850/900/1800/1900/2050 MHz bands), WLAN (such as 2.4/5.2/5.8 GHz bands), UWB (such as 3.1 ~ 10.6 GHz band) systems, and many related existing systems. Many innovative planar antennas for related applications such as in the internal mobile phone antennas, base-station antennas, WLAN mobile-unit (laptop, PDA or smartphone) and access-point antennas, and UWB antennas have been reported recently. These recent developments in planar antennas for applications in WWAN, WLAN, UWB systems, and the like will be addressed.

The topics for this short course will include (more than 100 related planar antenna designs will be presented):

(1) **Internal dual-band/multiband antennas for WWAN systems**, including PIFAs, very-low-profile monopoles, printed loop antennas, printed slot antennas for mobile phones, PDA phones, and the like; the concept for EM compatible (EMC) internal mobile phone antennas will be introduced. Perspective trends in the internal multiband mobile phone antenna design will be discussed.

(2) **Base-station antennas for WWAN systems**, including dual-band and/or dual-pol operations.

(3) **WLAN mobile-unit antennas**, including dual-band and/or diversity operations; the recently developed EMC chip antenna and the antenna mountable above the system ground plane of the mobile unit will be discussed.

(4) **WLAN access-point antennas**, including dual-band operation, broadband CP (broadside and omnidirectional) radiation, high-gain omnidirectional radiation and diversity operation.

(5) **UWB antennas for mobile units and access points**, including the design techniques for UWB impedance matching, improved omnidirectionality, pattern stability, polarization purity and band-notching.

(6) **DTV antennas for portable devices,** such as the mobile phone, PMP (portable media player), laptop computer, and the like.