Radar Systems

CODE: ELECGC16

This course is aimed at graduate-level engineers with a background in electronic engineering or physics. The emphasis is on physical principles, and on modern radar systems and signal processing techniques, for both civilian and defence applications. The course forms a module of a Masters degree programme in Wireless and Optical Communications. The module can be taken as part of this programme, or individually.

The course is presented over four days (24 hours). A further half-day revision session, followed by an assessment, can be taken if desired. The course is given using modern electronic presentation techniques and a full set of notes is provided.

The cost for the module taken individually is £1,500. No VAT is payable.

For further information or to register please contact:

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www.ee.ucl.ac.uk/cpd
• Introduction: historical background, radar terminology, radar band designations
• The radar equation: point targets, radar cross section, distributed targets, propagation, coverage diagrams
• Noise, clutter and detection: theory of detection, sea and land clutter models, CFAR processing
• Displays: A-scope, B-scope, PPI, modern displays
• Doppler radar and MTI: Doppler effect, delay-line cancellers, blind speeds, staggered PRFs, adaptive Doppler filtering
• Pulse Doppler processing and STAP: airborne radar, high, low and medium PRF operation, Space-Time Adaptive Processing
• Pulse compression: principles, the ambiguity function, the matched filter, chirp waveforms, SAW technology
• Waveform design: nonlinear FM, phase codes, waveform generation and compression
• FM radar: principles, radar equation, effect of phase and amplitude errors
• Synthetic Aperture Radar: principles, SAR processing, autofocus, spotlight mode, airborne and spaceborne systems and applications, interferometry, ISAR
• Tracking radar: conical scan, monopulse, α-β tracker, track-while-scan, Kalman filters
• Avionics and radionavigation: Air Traffic Control, primary and secondary radar, GPS, airborne radar
• Phased array radar: phased array principles, array signal processing, multifunction radar, scheduling
• Electronic Warfare: ESM, ECM, ECCM; superresolution, IFM, types of jammers, calculation of performance, adaptive arrays, LPI radar
• Stealth and counterstealth: stealth techniques for aircraft and other target types, low-frequency and UWB radar
• Bistatic radar: bistatic geometry, bistatic radar equation, synchronisation, illuminators of opportunity
• Sonar: similarities and differences to radar, underwater propagation, ASW and MCM systems
• System design examples: Airborne Early Warning (AEW) radar, vehicle collision avoidance radar, maritime navigation radar, weapon locating radar.

Teaching Staff

Professor Hugh Griffiths holds the THALES / Royal Academy Chair of RF Sensors in the Department of Electronic and Electrical Engineering at University College London. From 2006 - 2008 he was Principal of the Defence College of Management and Technology at Shrivenham, and from 2001 - 2006 he served as Head of the Department of Electronic and Electrical Engineering at UCL. His research interests include radar systems, synthetic aperture systems, and radar signal processing, and he has published over three hundred papers, books and technical articles in the fields of radar, sonar and antennas. He has given courses on radar and synthetic aperture radar at several international radar conferences worldwide. In 1996 he received the IEEE AESS Fred Nathanson Award, and he has also received the IEE Maxwell and Mountbatten Premiums. He is a Fellow of the IET, Fellow of the IEEE, and in 1997 he was elected to Fellowship of the Royal Academy of Engineering.

Dr Karl Woodbridge joined University College London in 1990 after 10 years working for Philips Electronics latterly as a project manager in the semiconductor electronics area. He is a Chartered Engineer and a Fellow of the IET. His research interests are mainly centered on air traffic management and radar systems. Current radar research activities at UCL include netted and narrowband systems, Doppler target classification and wireless detection and tracking. The above activities have been carried out in research investigator and technical consultancy roles for a range of customers in the civil and defence areas and have generated over 150 journal papers and conference presentations.

Additionally there will be Guest Lectures from Prof Tony Gillespie (Dstl) and Prof Simon Watt (THALES).