



Radar and Electronic Defence

Modules from a Masters Programme being offered to Continuing Professional Development students

The Masters Programme

To address the growing need for skilled engineers and scientists in the challenging fields of Radar and Electronic Defence, the University of Cape Town (UCT) and the Council of Science and Industrial Research (CSIR), in conjunction with international partners and industrial sponsors, including the King Abdulaziz City for Science and Technology (KACST), have established a Masters Degree in Engineering (MEng) with specialisation in Radar and Electronic Defence. Hosted in Cape Town, South Africa, students studying towards this degree will focus on relevant theory, technologies and applications with both coursework and project components. The programme had its first intake of students in February 2011.

Each course typically contains a lecture component of 5 full days, followed by weekly online seminars and tasks culminating in a written examination, over a five week period after the first, intensive lecture session. The programme is designed to facilitate students that cannot be resident in Cape Town for the full duration to complete all courses, by using distance learning techniques during the follow up period after each course (after the one week intensive lecture period). All students will, however, have to be present in Cape Town for the one week lecture period for each course. Elements of continuous assessment (problem sets, short projects) and a written examination are utilised to assess student performance.

For further information on the Masters Programme please refer to the website <http://radarmasters.co.za/>

Continuing Professional Development

Modules of this Masters Programme are offered to Continuing Professional Development students as separate certificated courses from which a participant can obtain CPD credits as these courses are registered with ECSA. These CPD courses are attendance based, and a certificate of attendance is issued.

THE CPD COURSES INCLUDE:

High Frequency Surface Wave Radar: 16 – 20 February 2015

The objective of the course on HF Radar is to equip students with a comprehensive overview of the state-of-the-art in HF Radar technology. To accomplish this, technical details of the historical developments in HF radar will be presented to establish the basis for studying modern systems.

Presented by: Prof Scott Glenn and Dr Hugh Roarty

Introduction to Radar: 2 – 6 March 2015

Introduction to Radar, the range equation, radar detection in interference, propagation effects and mechanisms, characteristics of clutter, target reflectivity, target reflectivity fluctuations, Doppler processing, Radar antennas, transmitters and receivers, radar signal processing, radar remote sensing.

Textbook: *Principles of Modern Radar*, Scitech Publishers

Presented by: Prof Piet van Genderen

Advanced Engineering Mathematics: 23 – 27 March 2015

This course provides a useful mathematical toolkit for the Radar and Electronic Defence Engineer. Emphasis is on practical calculation and useful 'tricks of the trade' rather than mathematical rigour. The textbook, *Advanced Engineering Mathematics*, E. Kreyszig (Wiley) (with many editions available but edition 9 preferred) is prescribed. Some notes are also made available to assist the student.

Specific course topics include (estimated number of lectures and acronyms shown in brackets): • Ordinary differential equations (7) (ODE) • Laplace transforms (3) (LT) • Fourier analysis (3) (FA) • Partial differential equations (2) (PDE) • Complex analysis (8) (CA)

Presented by: Dr Pieter Uys

Introduction to Electronic Defence: 13 – 17 April 2015

Electronic Defence: Threats, Requirements and Principles, Advanced Radar Threat, Modern Electronic Attach (EA) Systems—Architecture, Types, and Technology, EA against Modern Radar Systems, Digital Radio Frequency Memory, Electronic Defence Support, Expendables and Decoy Systems, Directed Energy Weapons and Stealth Technology, Applications of Electronic Defence.

Presented by: Dr Ferdie Potgieter

Signal Processing: 18 – 22 May 2015

Fundamentals, threshold detection, constant false alarm rate detector (CFAR), Doppler processing, Radar measurements, Radar tracking algorithms, fundamentals of pulse compression, overview of radar imaging.

Textbook: *Principles of Modern Radar*, Scitech Publishers

Presented by: Dr Amit Mishra

Clutter and Detection in Clutter: 29 June – 3 July 2015

The course is organized in three parts, which mainly cover aspects related to radar clutter modelling and analysis, optimum and adaptive radar detection of targets embedded in correlated Gaussian clutter and in heavy-tailed non-Gaussian clutter.

Presented by: Prof Maria Greco and Prof Fulvio Gini



Continuing Professional Development Programme

Faculty of Engineering & the Built Environment

Microwave Components and Antennas: 13 – 17 July 2015

This course describes the operation and design of microwave components used in radar and telecommunication systems including: transmission lines; microstrip, coaxial and waveguide circuits. Power sources/oscillators, amplifiers, noise in receivers and mixers, PIN diode switches and limiters. Antennas, including radar antennas and phased arrays.

Presented by: Barry Downing and A/Prof Daniel O'Hagan

COURSE INFORMATION FOR CPD PARTICIPANTS

Programme Convenor:

A/Prof Daniel W. O'Hagan, University of Cape Town

Lecturers

Daniel W. O'Hagan – University of Cape Town

Mike Inggs – University of Cape Town

Amit Mishra – University of Cape Town

Ferdie Potgieter – CSIR

Pieter Uys - University of Cape Town

Barry Downing – University of Cape Town

Scott Glenn – Rutgers University, USA

Hugh Roarty – Rutgers University, USA

Piet van Genderen – Delft University of Technology, The Netherlands

Maria Greco – University of Pisa, Italy

Fulvio Gini - University of Pisa, Italy

Who should attend?

Attendees are responsible for ensuring they have the necessary experience and educational background to derive full benefit from the course.

Format

Each module is structured in the following way:

a week of intensive contact time at UCT, comprising formal lectures, class assignments and seminars/tutorials

Cost

The fee for each course is R10 000.00. The fee includes a comprehensive set of course notes. Recommended text books are for the student's account.

Certificates and CPD Points

A certificate of attendance will be awarded to CPD participants. Participants need to attend 80% of the lectures to qualify for an attendance certificate.

CPD participants can also request a formal university transcript, which will show this course as part of a Professional Development Career.

Please note: If you are interested in attending this course for credit purposes, you will need to register for the Masters Programme or as an occasional student. If you attend the course as a CPD participant, credit cannot be claimed in retrospect.

Venue

All lectures will take place in Cape Town. Information on the specific venue will be sent to you after your application has been approved.

Application and Cancellation

Registration forms are available on the website www.cpd.uct.ac.za/applications/

In order to ensure a place on the course applicants must complete and return a signed registration form to the course administrators: Heidi Tait or Sandra Jemaar: ebe-cpd@uct.ac.za

Confirmation of acceptance will be sent on receipt of a registration form.

Registrations close one week before the start of each course

Cancellations must be received one week before the start of a course, or the full course fee will be charged.