



Dept. of Electrical Engineering | CPD Courses

# Radar and Electronic Defence

Master's Modules 2019



# Introduction



## The Master's 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 Master's 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 Master's Programme please refer to the website: <http://www.radarmasters.uct.ac.za/>

## Continuing Professional Development (CPD)

Modules of this Master's 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.

## 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.

## Introduction to Radar

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EEE5119Z: 11 – 15 February 2019

The principal aim of this course is to introduce students to the fundamental principles underlying radar systems and to enable them to understand and apply these principles to generic radar systems. The subject is specifically structured around these aims. On successful completion of this course, students will be able to:

- describe the main principles underlying radar systems.
- understand the role of each component of a radar system.
- use the radar equation to describe the performance of radar systems.
- understand how target and environmental characteristics affect the choice of system design parameters.
- describe and assess the relative advantages of different types of radars.

*Presenter: Mike Inggis*

*5 CPD points, ECSA course code: UCTREDITR19*

## Introduction to Electronic Defence

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EEE5120Z: 6 - 10 May 2019

The course will assess the fundamentals of Electronic Defence, focusing on radar applications.

Having successfully completed this course, students should achieve:

- Understanding of Electronic Defence main concepts
- Understanding of Electronic Support regarding its concepts and knowledge of ES measures and activities
- Understanding of Electronic Attack regarding its concepts and knowledge of EA measures and techniques
- Understanding of Electronic Protection regarding its concepts and knowledge of EP applications
- Understanding of Electronic Intelligence regarding its concepts and knowledge of ELINT activities and applications
- Understanding of the fundamentals of system architectures and basic signal processing techniques that are used in Electronic Defence

*Presenters: Craig Tong and Francois Maasdorp*

*5 CPD points, ECSA course code: UCTREDIED19*

## Advanced Engineering Mathematics

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EEE5108Z: 3 - 7 June 2019

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)

*Presenter: Pieter Uys*

*5 CPD points, ECSA course code: UCTREDAEM19*

## Microwave Components and Antennas

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EEE5121Z: 12 - 16 August 2019

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.

*Presenters: Barry Downing and Francois Schonken*

*5 CPD points, ECSA course code: UCTREDMCA19*

## Radar Signal and Data Processing

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EEE5105Z: 16 - 20 September 2019

This course presents the principles and techniques fundamental to the operation of the signal processing found in a radar system. The course follows the recommended textbook very closely.

*Specific course topics include:*

- Fundamentals of radar signals & signal processing
- Threshold detection of radar targets
- Constant false alarm rate detectors
- Doppler processing
- Radar measurements
- Radar tracking algorithms
- Fundamentals of pulse compression waveforms
- Overview of radar imaging

*Presenters: Fulvio Gini and Maria Greco*

*5 CPD points, ECSA course code: UCTREDRSDP19*

# Overview

<b>Programme</b>	Radar and Electronic Defence Master's Modules
<b>Modules and duration</b>	Introduction to Radar: 11 – 15 February 2019 Introduction to Electronic Defence: 6 - 10 May 2019 Advanced Engineering Mathematics: 3 - 7 June 2019 Microwave Components and Antennas: 12 – 16 August 2019 Radar Signal and Data Processing: 16 – 20 September 2019
<b>Venue</b>	Upper Campus, University of Cape Town
<b>CPD</b>	CPD points and ECSA codes as indicated per module
<b>Participants</b>	Attendees are responsible for ensuring they have the necessary experience and educational background to derive full benefit from the course.
<b>Fees</b>	R12 500 (5-day course)

# Registration

## Registration and Cancellation

- [Register for this course](#)
- Registration covers attendance of all sessions of the course, lunch vouchers, and course material.
- Registrations close one week before the start of the course. Confirmation of acceptance will be sent on receipt of a registration form.
- Cancellations must be received one week before the start of a course, or the full course fee will be charged.
- For more information on application and registration procedures, please visit our website: [www.cpd.uct.ac.za](http://www.cpd.uct.ac.za)

## 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.

For further information on the Master's programme please see the website:

<http://www.radarmasters.uct.ac.za/>

## Contact details

For more information or details on CPD courses, visit our website or contact us.

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**Web:** <http://www.cpd.uct.ac.za>

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