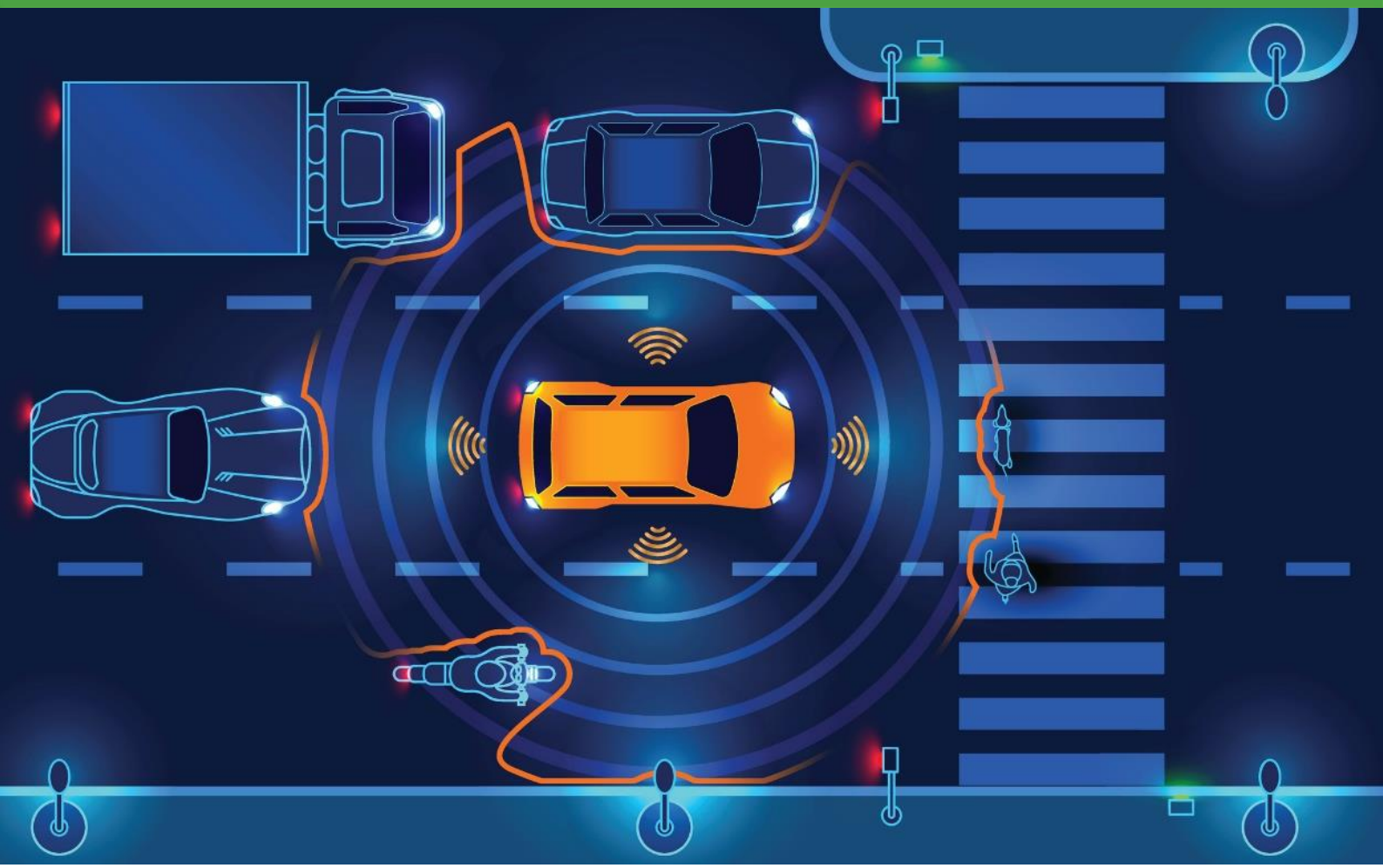
FACULTY OF
ENGINEERING &
THE BUILT ENVIRONMENT

CPD
CONTINUING PROFESSIONAL DEVELOPMENT



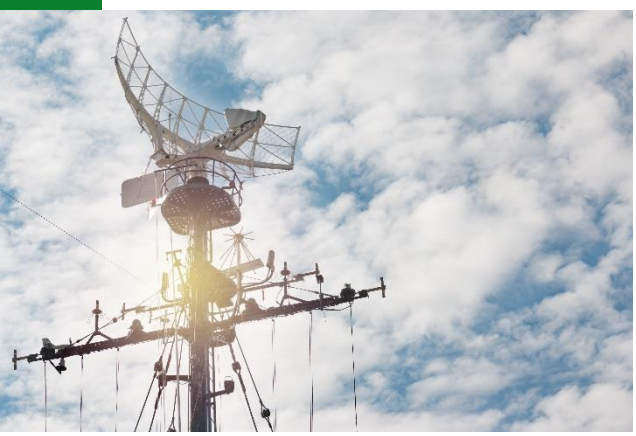
Dept. of Electrical Engineering | CPD Courses

Radar and Electronic Defence

Masters Modules 2020

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

Introduction



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://www.radarmasters.uct.ac.za/

Continuing Professional Development (CPD)

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.

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

EEE5119Z: 24 – 28 February 2020

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: Piet van Genderen
5 CPD points, ECSA course code: UCTREDITR20

Introduction to Electronic Defence

EEE5120Z: Dates TBC

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: UCTREDIED20

Advanced Engineering Mathematics

EEE5108Z: 30 March – 3 April 2020

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: UCTREDAEM20

Radar Signal and Data Processing

EEE5105Z: 29 June – 3 July 2020

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: Chris Baker
5 CPD points, ECSA course code: UCTREDRSDP20

Microwave Components and Antennas

EEE5121Z: 10 – 14 August 2020

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: UCTREDMCA20

Advanced Radar Technologies and Algorithms

EEE5132Z: 14 – 18 September 2020

This course is organized in three parts, which mainly cover aspects related to High Resolution Radar (HRR), Synthetic Aperture Radar (SAR) and Inverse Synthetic Aperture Radar (ISAR).
Having successfully completed this course, students should:

- understand the concept behind high resolution radar, SAR and ISAR
- understand the techniques that are currently used in high resolution radar, SAR and ISAR and be able to choose which ones are the most suitable for a given scenario,
- understand the significance of using SAR/ISAR images in a number of applications,
- be able to implement simple SAR/ISAR algorithms,
- understand the main differences between radar imaging of static scenes and non-cooperative moving targets,
- be able to predict radar imaging performance in some scenarios.

Presenters: Marco Martorella
5 CPD points, ECSA course code: UCTREDARTA20

Overview

Programme	Radar and Electronic Defence Masters Modules
Modules and duration	Introduction to Radar: 24 – 28 February 2020 Introduction to Electronic Defence: Dates to be confirmed Advanced Engineering Mathematics: 30 March – 3 April 2020 Radar Signal and Data Processing: 29 June – 3 July 2020 Microwave Components and Antennas: 10 – 14 August 2020 Advanced Radar Technologies and Algorithms: 14 – 18 September 2020
Venue	Upper Campus, University of Cape Town
CPD	CPD points and ECSA codes as indicated per module
Participants	Attendees are responsible for ensuring they have the necessary experience and educational background to derive full benefit from the course.
Fees	R15 000 (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

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.

Contact details

For further information on the Masters programme please see the website:
http://www.radarmasters.uct.ac.za/

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

Web: http://www.cpd.uct.ac.za
E-mail: ebe-cpd@uct.ac.za

Physical address
CPD Programme
Room 6.10, 6th Floor
New Engineering Building
Upper Campus
University of Cape Town
South Africa

Postal address
CPD Programme
EBE Faculty
University of Cape Town
Private Bag X3
Rondebosch 7701
South Africa

Programme administrators
Sandra Jemaar: +27 (0)21 650 5793
Heidi Tait: +27 (0)21 650 4922
