



Dept. of Electrical Engineering | CPD courses

## FPGA Development for Radar, Radio- Astronomy and Communications

09 – 13 September 2024



# 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 master's degree in engineering (MSc, Eng and MEng) with specialisation in Radar and Electronic Defence.

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, must be present in Cape Town for the one-week lecture period for each course.

For further information on the master's programme please visit:

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

### Degree Structure

A master's degree requires students to pass 180 credits of coursework and dissertation, with one credit requiring about 10 hours of work. Thus, the average time required to complete a master's degree is about 1800 hours of work.

The master's degree in Radar is offered with three different degree structures:

1. Professional Taught Master's Degree (MEng Radar):  
This master's degree consists of 6 x 20 credit courses and a 60-credit mini dissertation. There are two core courses, viz. Introduction to Radar and Mathematics, plus four more specialized radar courses. We also offer a stream of Electronic Defence within this degree structure.
2. Research Master's Degree with Coursework (MSc (Eng) Electrical Engineering Specializing in Radar):  
This master's degree consists of 3 x 20 credit courses and a 120-credit dissertation. The core course is Introduction to Radar, plus two more specialized radar courses.
3. Research Master's Degree by Dissertation (MSc (Eng) Electrical Engineering Specializing in Radar):  
This master's degree requires a 180-credit research dissertation. This degree is intended for students with radar experience who would not benefit from the coursework, or students who wish to tackle a large research project.

## Continuation or Upgrade to PhD

Students who complete and pass any of the three master's degrees can continue to study for a PhD. Alternatively, students who are registered for either of the MSc (Eng) Research master's degrees and who are progressing well with their studies, can upgrade to a PhD without completing the master's degree.

## Occasional Postgraduate Registration

We offer the option of registering as an occasional postgraduate student for individual courses for nondegree purposes. For busy people who work in industry, but who would like to register for a master's degree, the option exists to pass some or all 6 courses over 2 or 3 years, whilst continuing to work in industry, and to complete the remaining courses and the minor dissertation in less than 1-year full time. The credits passed as an occasional student can be transferred into the degree.

## Entry Requirements for a Radar Master's Degree

1. A 4-year Engineering Degree or Science Honours degree with at least 2 years of Mathematics.
2. A BTech Degree from a South African University of Technology with at least 5 years of experience in Radar or another relevant field.
3. A 3-year Bachelor of Science degree with at least 2 years of Mathematics and 5 years of experience in Radar or another relevant field.
4. A level of competence that has been attained in any other manner, which, in the opinion of Senate and on the recommendation of the faculty, is adequate for the purpose of admission as a candidate for the degree.

Please refer to the website [www.radarmasters.uct.co.za/](http://www.radarmasters.uct.co.za/) for further information or contact the programme convenor at [stephen.paine@uct.ac.za](mailto:stephen.paine@uct.ac.za) for additional information.

## Continuing Professional Development (CPD) courses

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.

### Methods of Instruction

The FPGA Development for Radar, Radio Astronomy and Communications CPD course lecture week consists of 5 days, each of which are broken into morning lectures from 09:00 to 13:00 (with a half-hour tea-break at 11:00) and an afternoon tutorial / practical from 14:00 to 17:30

The afternoon sessions are semi-formal, in the sense that the lecturer will drive the activities and be available for questions, but the participants can structure the time as they deem appropriate.

# Course Content

This course presents the principles and techniques fundamental to low-level FPGA firmware development. It is biased towards digital signal processing typically found in Radar, Radio-astronomy and Communication systems.

Although the course focuses on Altera tools, Xilinx tools are similar. After completing this course, the participant will have enough background to make use of the Xilinx tool-set with minimal effort.

Embedded soft-core processors and SoC systems are not included in this course. Furthermore, this course is aimed at low level development: high level synthesis is not covered.

5 CPD points, ECSA course code: UCTREDFDRC24

## Course Convenor



**Dr. Stephen Paine** is a distinguished academic specializing in Radar Remote Sensing at the University of Cape Town. With a comprehensive educational background in engineering, including a BSc, MSc, and PhD, Dr. Paine has established a robust research profile centred on advanced radar technologies and their applications. His research interests span across Synthetic Aperture Radar (SAR) processing techniques, radar-based detection systems, and environmental monitoring.

## Overview

<b>Programme</b>	Radar and Electronic Defence Masters Modules
<b>Duration</b>	09 – 13 September 2024
<b>Venue</b>	Upper Campus, University of Cape Town
<b>CPD</b>	5 CPD points and ECSA validation number: UCTREDFDRC24
<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 per course</b>	Standard fee: R16 500 UCT student fee: R8 250

# Registration

## Registration and Cancellation

- [Register online](#)
- Registration covers attendance of all sessions of the course 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: <http://www.cpd.uct.ac.za/cpd/registration-policies>

## 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 master's programme or as an occasional student. If you attend the course as a CPD participant, credit cannot be claimed in retrospect.

## Contact details:

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

<b>Web:</b> <a href="http://www.cpd.uct.ac.za">http://www.cpd.uct.ac.za</a>	
<b>E-mail:</b> <a href="mailto:ebe-cpd@uct.ac.za">ebe-cpd@uct.ac.za</a>	
<b>Physical address</b> CPD Programme Room 6.10, 6th Floor New Engineering Building Upper Campus University of Cape Town South Africa	<b>Postal address</b> CPD Programme EBE Faculty University of Cape Town Private Bag X3 Rondebosch 7701 South Africa
<b>CPD course administrators</b> Gillian Williams: +27 (0)21 650 7239 Sandra Jemaar: +27 (0)21 650 5793 Heidi Tait: +27 (0)21 650 4922	<b>Programme Convenor</b> Dr Stephen Paine <a href="mailto:Stephen.paine@uct.ac.za">Stephen.paine@uct.ac.za</a>