



Sapienza PhD in ICT

Doctoral program in Information and Communications Technologies at Sapienza Università di Roma, Rome, Italy

First Year Doctoral Program Form

LAST NAME	Pieralice
NAME	Federica
CURRICULUM	Radar and remote sensing
DOCTORAL CYCLE	XXXI

The Doctoral Program Form contains, year by year, the description of the PhD program of each Doctoral student. This form must be submitted to the PhD coordinator with roughly the following timing:

- by the end of February of the first year for first year students
- before the admission to the second year by perspective second year students
- before the admission to the third year by perspective third year students

The Doctoral Program Proposal is approved by the PhD board shortly after submission. The Doctoral Program requirements place formalized emphasis on methodology and mastery of fundamental and applied engineering systems concepts. A Doctoral Program Proposal should be constructed in agreement with the Faculty mentor, that is the supervisor or tutor, by complying to the requirements, described in the Tables below.

ADVANCED COURSES: 12 CREDIT FORMATION UNITS (CFU)¹

Only courses/schools providing a final verification test with pass/fail outcome certified by instructor can be included here.

Title	Type	Duration / period	CFU²	Motivation for selection
Sistemi Radar	Master Degree Course	22 February-27 May 2016 90 hours	9	This course is important for enriching my knowledge about the structure of radar systems and techniques, in particular it provides the main elements needed for their preliminary design and their performance evaluation. As a student graduated in Spatial Engineering I did not have the possibility to attend this course during my Master Degree: therefore I think this course is fundamental to complete my preparation on radar systems and techniques.
Laboratorio di telerilevamento	Master Degree Course	22 February-27 May 2016 30 hours	3	In this course the basic principles are presented for: (i) computer simulation of typical operational scenarios for remote sensing systems operation, (ii) computer and/or real-time hardware implementation of the main radar signal processing techniques. In particular in the first part of the course the basic concepts related to the operation of a passive radar system are briefly summarized with reference to the functions of target detection, disturbance cancellation, target localization and motion estimation. Therefore, I think this course will provide a more complete and general vision of passive radar systems.
Total CFU			12	

SEMINARS AND LABORATORY ACTIVITIES: 6 CFU³

¹ Please insert lines as required/appropriate, and for each line complete each column of the Table.

² Indicate here the CFUs that can be accounted for as a result of the successful completion of the activity; for Master Degree courses, assume 1 CFU = 8 teaching hours + 12 homework/study hours, for a total of 20 hours. This rule can be slightly adjusted for other types of courses/activities (e.g., PhD courses may require slightly less hours per CFU)

³ Please insert lines as required/appropriate, and for each line complete each column of the Table.

Activity	Type	Duration / period	CFU ⁴	Motivation for selection
Optical Wireless Communications for outdoor, indoor, and underwater applications	Short course	12-14 January 2016	3	Optical wireless communications have recently received particular attention in both academia and industry due to their potential in providing very high-rate data transmission in various application scenarios. This presentation provides an overview on OWC systems in three main application areas, that is, outdoor, indoor, and underwater contexts.
Scrittura tecnico-scientifica	Short Course	January-February 2016 24 hours	4	The course aims at providing fundamental elements of the technical and scientific writing. I chose this course to learn the basics for scientific papers writing.
Total CFU			7	

ADDITIONAL INDEPENDENT FORMATION AND RESEARCH ACTIVITIES: 6 CFU⁵				
Indicate activities that extend and complement the mandatory activities listed above				
Activity	Type	Duration / period	CFU ⁶	Motivation for selection
Radar Summer School The main focus of the 7 th International Summer School on Radar/SAR lies in particular in imparting the knowledge of the physical fundamentals and technologies of modern Radar/SAR systems and the necessary signal processing steps. (http://www.radarsummerschool.fraunhofer.de/summerschool)	Summer school	15 - 22 July 2016, Bonn, Germany	>5	The International Summer School will consist of a series of lectures given by recognized experts on the above topics and related fields of application. Therefore, this summer school can give me the possibility to improve my knowledge on radar and synthetic aperture radar (SAR) systems and techniques; moreover in this frame I will have the possibility also to meet and compare my experience with PhD students from other countries.
Total CFU			>5	

RESEARCH ACTIVITY: 36 CFU	
Research area	Radar and remote sensing: Active and passive radar techniques based on satellite and airborne transmitters for surveillance applications
Research topic	<p>The core of my research activity is the development of techniques for monitoring and surveillance applications, through:</p> <ol style="list-style-type: none"> I. Passive radar systems based on navigation satellite transmitters II. Radar imaging systems (SAR) based on satellite or airborne sensors <p>In particular, the main goal of first point (I) is the development of techniques for moving target detection, localization and tracking in the area under surveillance exploiting GNSS (Global Navigation Satellite Systems) opportunity transmitters.</p> <p>The principal aim of second point (II) is the study and development of change detection techniques for multi-temporal SAR images.</p>
Framework of the proposed research topic	<p>The main activities to be carried out during the first year of my PhD are briefly summarized in the following.</p> <p>For the first topic, Passive Bistatic Radar (PBR) systems, the planned activities are:</p> <ul style="list-style-type: none"> • Literature review to build a solid knowledge in Passive Bistatic Radar (PBR) systems with specific attention to the use of satellite (more in particular GNSS) opportunity

⁴ Indicate here the CFUs that can be accounted for as a result of the successful completion of the activity; as a rule of thumb, assume 1 CFU = 20 working hours.

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	<p>transmitters;</p> <ul style="list-style-type: none"> • Development/implementation of single channel techniques for moving target detection and performance analysis using synthetic datasets; • Application of the developed techniques to experimental datasets. <p>For the second topic, Change Detection (CD) techniques, the planned activities are:</p> <ul style="list-style-type: none"> • Development/implementation of adaptive CD techniques, analysis of achievable performance and comparison to the performance of the corresponding non adaptive cases (i.e. a priori known parameters); • Development of adaptive CD techniques for non-homogenous background and analysis of achievable performance; • Application of the developed techniques to experimental (or emulated) multi-temporal datasets. <p>As part of a collaboration with the national radar industry the carrying out of some of the above activities depends on the availability of the data from the partner.</p>
Research environment	<p>The main activities will take place within the RRSN (Radar Remote Sensing and Navigation) group at DIET Department.</p> <p>However, cooperation is expected with academic institutions and industrial partners. The first research topic will be carried out inside the H2020 Research Project "Galileo-based passive radar system for maritime surveillance (spyGLASS)". The second topic could involve in part cooperation activities with the national radar industry.</p>

FACULTY MENTOR (TUTOR OR SUPERVISOR)

Prof. Dr.	Debora Pastina
Supervisor signature for approval	

Signature of Doctoral student

Federica Petalice

Date

29/02/2016