



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	Leonori
NAME	Stefano
CURRICULUM	Information and Communication Technology (ICT)
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	CFU ²	Motivation for selection
Computational Intelligence	Master Degree course in Ingegneria delle Comunicazioni	4 hours and 30 minutes per week in the 1st semester	6	Fuzzy logic and evolutionary algorithms are topics of my PhD plans. Soft computing techniques are widely used in Smart Grid and Microgrid management. My aim is to study in depth soft computing technique especially evolutionary algorithms in order to apply my studies on my Microgrid project
Distributed Optimization over Complex Networks	PhD course in ICT	4 hours and 30 minutes per week in the 2nd semester	6	Graph theory is an efficient method to represent and study an electric grid. I want to follow this course in order to represent and manage a Microgrid by a graph.
Total CFU			12	

SEMINARS AND LABORATORY ACTIVITIES: 6 CFU³

Activity	Type	Duration / period	CFU ⁴	Motivation for selection
Dr. Konstantin Kholostov "Porous silicon solar cells"	seminar	December 17, 2015	1/3	PV technology has a key role in smart grid and micro grid development.

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.


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.

Laboratory activities on micro grid power flow controller design	laboratory	2 nd semester 2016	5	The activity regards a power flow controller design. This work will be utilize to publish a paper that treats on power flow management and optimization in micro grid systems. The controller has the purpose to manage and control a real electric load with a distributed generator and a energy storage system.
Other future ICT seminars	seminar		2/3	
Total CFU			6	

ADDITIONAL INDEPENDENT FORMATION AND RESEARCH ACTIVITIES: 6 CFU ⁶				
Indicate activities that extend and complement the mandatory activities listed above				
Activity	Type	Duration / period	CFU ⁶	Motivation for selection
Poligris 2015	Summer school	5 days 8 hours per days	5	School on Smart Grid at UNISA (university of Salerno). It introduce topics and explain many different aspects and what are the new challenge to face about Smart grid and microgrids research.
Participation to the conference and workshop at the event "Isola della Sostenibilit�" 2016	Conference	2 days, 3 hours for day	1	Conference about energy sustainability and mobility. It regards as well microgrids and smart grid topics such as vehicle to grid systems, electric mobility etc.
Total CFU			6	

RESEARCH ACTIVITY: 36 CFU	
Research area	Energy management in microgrid and Smart Grid. Power flow management and optimization. Soft computing technique.
Research topic	Power flow management and optimization on Smart Grid and Microgrid - Optimization of the Energy Storage System unit provided to manage a micro grid power flows. Modeling of an energy storage system, micro grid elements (users and distributed electric power generators) and smart grid elements. Designing and implementation of microgrid controller. Modelling of a micro grid system in Matlab/Simulink/Power System represented by a graph network employed to optimize the Microgrid power flow thanks to a multi objective evolutionary algorithm. Development of a power flow controller for microgrids based on soft computing technique such as fuzzy logic and multi objective evolutionary algorithm. Implementation of the power flow controller on ARDUINO in order to connect and manage a power load to a generator and an energy storage system.
Framework of the proposed research topic	Microgrid and smart grid is a multi-disciplinary topic ranging from power systems analysis and modeling (distributed generation, energy storage systems, power converters, kinds of user etc.) to information and communication technologies (soft computing techniques, graph theory etc.). Micro grid and Smart Grid development is necessary for the integration of the renewable distributed power source in the electric main grid. These systems usually exploit energy storage system, power converters ICT technologies and soft computing techniques in order to guarantee the stability of the electric grid, the quality of energy dispatched to the load, the consumption of the energy produced and hence the energy saving in order to reduce the cost of the kWh dispatched. The research in microgrid and Smart Grid needs studies in power systems, control strategy optimization, soft computing technique most suitable in such problems.
Research environment	Work and study in DIET lab of intelligent computational and pervasive system and POMOS lab of intelligent system.

FACULTY MENTOR (TUTOR OR SUPERVISOR)	
Prof. Dr.	Name and last name of supervisor
Supervisor signature for approval	Fabio Massimo Frattale Mascioli 


Signature of Doctoral student

Date

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⁶ 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.