



Sapienza PhD in ICT

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

Second Year Doctoral Program Form

LAST NAME	Zanaj
NAME	Eljona
CURRICULUM	Information and Communication Engineering
DOCTORAL CYCLE	XXXIII

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: 0 CREDIT FORMATION UNITS (CFU)¹²

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

Title	Type	Duration / period	CFU ³	Motivation for selection
Total CFU				

SEMINARS AND LABORATORY ACTIVITIES: 6 CFU⁴

Activity	Type	Duration / period	CFU ⁵	Motivation for selection
Insert title of activity (seminar, laboratory sessions) and a description of goals and expected results	Insert here activity type, e.g. seminar, lab sessions	Insert duration (measured in hours or days) and period of year		Insert here a detailed explanation of why the activity was selected and included in the doctoral program, and how it connects with the research area of the PhD student.
Seminars offered by DIET Dept.	Seminar		2	The seminars offered by DIET about topic related my PhD could be a good possibility to broaden my knowledge
Research activity in Professor Di Benedetto's ACTS lab	Laboratory	December - June	4	Within the ACTS Lab we will be able to perform laboratory sessions to better acquire general and detailed knowledge in impulsive communications.

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

² During the second year, the doctoral student may complete the credits corresponding to advanced courses that were not completed in the first year.

³ 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)

⁴ Please insert lines as required/appropriate, and for each line complete each column of the Table.

⁵ 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.

Total CFU	6
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ADDITIONAL INDEPENDENT FORMATION AND RESEARCH ACTIVITIES: 6 CFU⁶
 Indicate activities that extend and complement the mandatory activities listed above

Activity	Type	Duration / period	CFU ⁷	Motivation for selection
Insert the title of the activity and a description of goals and expected results.	Insert here activity type, (e.g. course, seminar, lab, tutorial)	Insert here the duration of the activity (measured in full days of work) and the period of the year when it will be carried out		Insert here a detailed explanation of why the activity was selected and included in the program form, taking into account the research area of the PhD candidate, any previous activity related to the one being proposed, and specific interest of the candidate in the topic covered by the activity.
Smart devices & Mobile Emerging Technologies	Online certified course	November to December 2018	6	Learn about aspects of new product and app design & development, as well as business planning. In addition, the core technology and components of the world's most popular smartphones and smart watches are introduced along with details of the iOS and Android smartphone OSs (Operating Systems) and mobile communications 1G to 5G.
Total CFU			6	


RESEARCH ACTIVITY: 42 CFU

Research area	IoT cellular architectures and technologies
Research topic	The study of IoT architecture and also of IoT technologies. Nowadays IoT has become an integral part of our everyday life. With each day that passes new technologies and new devices using IoT appear on the market becoming more and more important in our life. The main focus of this study is IoT cellular architecture and the new technologies it can be used. More specifically the study of NarrowBand Internet of Things.
Framework of the proposed research topic	Cellular technologies have been designed for reliability, security, and scalability and provide a strong foundation for IoT connectivity with a unique combination of functionality and performance. Through software upgrades, existing deployed infrastructure provides a base for unmatched IoT coverage. The next step in the evolution of cellular IoT on the road to 5G, 3GPP Release 14, offers support for Critical IoT applications with extreme reliability, very low latency, and very high availability. D2D communication represents a new type of wireless communication paradigm technology which allows direct communication between nearby wireless devices while remaining controlled under macro base stations. With D2D communication, the data between a UE pair does not need to traverse through the core network such as access points (APs) or base stations (BS) as long as they are in proximity. This study will be focused on: <ul style="list-style-type: none"> - The study of NB-IoT. NB-IoT is an important part of the Internet of Things. The aim is for this technology to provide cost-effective connectivity to billions of IoT devices, supporting low power consumption, the use of low-cost devices, and provision of excellent coverage – all rolled out as software on top of existing LTE infrastructure. - The study of D2D communication focussing on the interference that exists between the devices and the cellular users.
Research environment	Collaborations are being explored with different operators in the telecommunications field. A research collaboration in place with Telecom Italia, that already have a consolidated relationship with the ACTS Lab. Another possible collaboration is with Rohde & Schwarz Laboratories for use of their laboratory and devices during the study of NB-IoT

PHD SPECIFIC TOPIC

PhD dissertation title	NB-IoT combination with other technologies
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FACULTY MENTOR (TUTOR OR SUPERVISOR)

Prof. Dr.	Name and last name of supervisor
Supervisor signature for approval	

Signature of Doctoral student



Date

25/10/2018

⁶ Please insert lines as required/appropriate, and for each line complete each column of the Table.

⁷ 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.