



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	Ghisotti
NAME	Sandro
CURRICULUM	Electronics Engineering
DOCTORAL CYCLE	XXXIV

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
Radio Frequency Electronic Systems <i>(Sistemi Elettronici a Radio Frequenza)</i>	Master course	II Semester February - May 2019	9	This course provides an in depth overview about RF devices in telecommunication systems. It deals with RF oscillators, amplifiers, filters, attenuators, mixers, PLL, modulators/demodulators. The way it investigates microwave amplifiers and RF power amplifiers, along with the use of RF simulation CAD, are strictly connected to the topic of my research.
Future Master Course Multidisciplinary Laboratory of Electronic I <i>(Laboratorio Multidisciplinare di Elettronica I)</i>	Master course	I Semester Sept. - Dec. 2019	6	This course describes RF instrumentation (vector network analyzer and spectrum analyzer), along with measurements techniques
Total CFU			15	

SEMINARS AND LABORATORY ACTIVITIES: 6 CFU³

Activity	Type	Duration / period	CFU ⁴	Motivation for selection
Student support during Prof. Pisa's Radio Frequency Electronic Systems lectures	Tutorial	6 months	2	To enrich and improve my teaching skills and practice with AWR Microwave Office software
Future ICT Seminars	Seminar		4	I am going to attend seminars as soon as Diet delivers them.
Total CFU			6	

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.

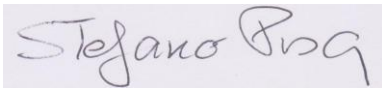
ADDITIONAL INDEPENDENT FORMATION AND RESEARCH ACTIVITIES: 6 CFU⁵
 Indicate activities that extend and complement the mandatory activities listed above

Activity	Type	Duration / period	CFU ⁶	Motivation for selection
SIE PhD School 2019	Summer school	3 days/ Summer 2019	4	To be a part of a well-known PhD school and get in touch with the latest innovations in RF/microwave electronics
Open Diet	Presentation	March 2019	2	Knowledge sharing and build some new teaching skills
Total CFU			6	

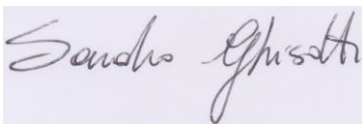
RESEARCH ACTIVITY: 36 CFU

Research area	High frequency electronics. Radio frequency power amplifiers for radar and communication wireless systems: advanced and innovative architectures in GaN technology.
Research topic	The goal of the research activity is about investigating and proposing innovative circuit topologies and novel design methodologies, in order to address three main radio frequency power amplifiers issues: efficiency, bandwidth and linearity. Hybrid prototypes in GaN technology will be implemented.
Framework of the proposed research topic	Today's wireless communication systems require a large amount of data traffic, and therefore a broader bandwidth. To reach such a goal, complex modulation schemes (i.e. OFDM) are being employed, which leads to high peak-to-average power ratio (PAPR) modulated signals. Doherty Power Amplifier (DPA) is the workhorse of any power amplifier, because of its high efficiency requirement when processing high PAPR signals. The main fault of such an architecture is about its bandwidth limitation, because of its inherent structure. This represents a real issue for multi-standard communication signals, which limits the employment of this power configuration in base stations. On the other hand, if we think about any wireless system, such as one of the most complex as a satellite system, efficiency value becomes a crucial feature that has to be deeply taken into account when designing a power amplifier, as long as its linear behavior.
Research environment	The research activity of this first year will be developed at the "Microwave and Electromagnetic Compatibility Laboratory" (MEC - DIET Department). Collaboration with an American GaN power transistors manufacturer is already in place. Further collaborations are being explored with different operators in high frequency electronics.

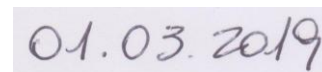
FACULTY MENTOR (TUTOR OR SUPERVISOR)

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

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.