

## PROFILE

**PhD PROGRAMME IN COMPUTER SCIENCE AND MATHEMATICS**

Subject area CUN: 01 Mathematics and Computer Science, 09 Industrial and Information Engineering

Coordinator: Prof. Maria Francesca COSTABILE

Administrative office: Dipartimento di Informatica – Università di Bari Aldo Moro

PEC: direzione.di@pec.uniba.it

Duration: 3 years

Number of available positions: 9

- 5 positions with scholarships funded by the University; 1 of these has a priority for graduates from foreign Universities.
- 1 position without scholarship
- 1 position with scholarships funded by STIIMA-CNR, for Curriculum 1 Computer Science, to develop research on the following topic:

**Non-destructive contactless quality control in the agroalimentary supply chain**

The research will deal with the application of computer vision and machine learning to the analysis of agro-alimentary products to achieve the following objectives: a) to evaluate their global visual quality; b) to estimate some of their internal characteristics that determine nutraceutical and organoleptic properties; c) to verify the sustainability of their cultivation strategies in terms of use of critical resources (water, fertilizers, ... ). The overall goal is to study, to develop and to verify experimentally a computer vision system that exploits artificial intelligence and machine learning to be effective and flexible on several products and in different environments along the whole supply chain. The system is expected to combine the low-cost, fast, non-destructive and contactless characteristics of human visual evaluations with objectivity and consistency that are typical of laboratory methodologies.

- 2 position with a “higher education apprenticeship contract” for graduates under the age of 30, for Curriculum 1 Computer Science. The contracts are established with **Deloitte Risk Advisory Srl** - Milan for developing research on topic C1, and with Spin-off SER&P for developing research on topic C2:

**C1. Cyber Security in Smartcities**

Smartcities as an element of experimentation with new urban strategies aimed at improving quality of life and well-being of citizens also through the use of ICT technologies, are gradually becoming a reality. A smart city is a complex and strongly interconnected system, inspired by a multidimensional model that sees different technologies intersect multiple services in different application domains, from health to welfare through mobility and energy. In this scenario, which is seeing an increasing number of interacting devices, sensors and software system, security becomes a highly critical element. In this scenario, the goal of the research is the proposition and experimentation of new protection methods, inspired by the Detection-Response-Prevention model, able to increase resiliency of smartcities by mitigating the waterfall effects.

**C2. Cyber Security in the development of unconventional systems**

The speed impressed on the digitization process, also as a consequence of the pandemic crisis in progress, is causing an exponential growth in threats to the privacy and security of software systems and a significant expansion of the attack perimeter. Another relevant trend is

represented by the increase in “unconventional systems”, such as cyber-physical systems strongly based on Artificial Intelligence, for example self-driving and semi-autonomous vehicles, in which the vulnerabilities are not located in the code but can also arise from the inability of algorithms used to correctly analyze atypical and unexpected behaviors or even emerge from the combined use of software systems and physical devices. The goal of the research is the proposition and experimentation of advanced software processes, guidelines and tools able to operate in complex and unconventional scenarios, supporting the software engineer in the development of secure systems as well as in securing the existing ones.

*Curricula:*

1. Computer Science (Scientific Subject Code: INF/01, ING-INF/05)
2. Mathematics (Scientific Subject Code: MAT/03, MAT/04, MAT/05, MAT/06, MAT/07, MAT/08)

Even if the PhD programme is organized in the two curricula mentioned above, the available positions will be assigned according to the ranking obtained by the applicants, until all positions are covered and by taking into account the reserved positions. Thus, the applicants do not have to provide their choice of the curriculum in the application.

**Admission procedure**

The applicants will be evaluated on the basis of: a) the documents presented with the application, b) an oral exam that will also include the assessment of the applicant’s knowledge of English. The exam will be online.

As regards the applicants to either the position with scholarships funded by STIIMA-CNR or to one or both positions with apprenticeship contract, during the oral exam the Committee will also ask questions about the specific research topic. Applicants interested in this position with an apprenticeship contract have to indicate it in the application.

**Admission exam date and time:**

The exams will start on July 22<sup>nd</sup> 2021. Exact date and time will be communicated to each applicant via email by July 21<sup>st</sup> 2021; the exam schedule will also appear on the website of the PhD Programme in Computer Science and Mathematics (<http://dottorato.di.uniba.it>).

**Position reserved to graduates at foreign Universities**

The applicants will be evaluated on the basis of: a) the documents presented with the application, b) an interview in which, among other things, they will discuss a research project (written in English, max 500 words) presented with the application. The interview, which will be in English or Italian depending on the applicant’s choice, will be conducted online. The results of the interview will be combined with the evaluation of the application documents to create a ranking. In case the scholarships will not be assigned to graduates at foreign Universities, it will be awarded to the next students in the ranking of ordinary positions.

*Interview date and time*

The interviews will start on July 22<sup>nd</sup> 2021. Exact date and time will be communicated to each applicant via email by July 21<sup>st</sup> 2021; the interview schedule will also appear on the website of the PhD Programme in Computer Science and Mathematics (<http://dottorato.di.uniba.it>).

**For more information, see <http://dottorato.di.uniba.it>**