

Master Degree in Embedded Computing Systems

jointly offered by the **University of Pisa** - Department of Information Engineering - and **Scuola Superiore Sant'Anna** - Institute of Communication, Information and Perception Technologies.



Why Embedded Systems?

Over 98% of the computers in the world are embedded into a larger system to manage its resources, control its functions, and simplify the user interface. In the last years, embedded computing systems, also called **Cyber-Physical Systems**, have grown exponentially in areas like industrial automation, avionics, automotive, telecommunications, consumer electronics, and robotics. The number of application domains is rapidly expanding in other fields, like civil protection, intelligent transport systems, agriculture, game industry, sport, and medicine. Acquiring the expertise for designing and programming such systems is essential to stay on the leading edge in the future.

Objectives

This innovative two-year Master will train students to design, analyze, and implement embedded systems. The program is ideally suited for students with a background in Computer Science/Engineering who wish to pursue industrial jobs or academic research in automotive, avionics, aerospace, defense, industrial automation, multimedia, healthcare, and consumer electronics.

Core topics include real-time control software, operating systems, distributed sensing and computing, model-based design and verification, wireless sensor/actuator networks, human-machine interfaces, virtual and augmented reality.

Courses

Lectures are given in English and include laboratory sessions with project assignments. The program is divided in 4 semesters and include areas like:

- real-time operating systems;
- sensory acquisition and processing;

- motor control;
- microprocessor, multiprocessor, and multi-core architectures;
- distributed systems and sensor networks;
- optimization methods;
- modelling and timing analysis;
- software verification;
- advanced man-machine interfaces.

Admission requirements and selection

- Laurea di I livello (Bachelor of Science - First Cycle Degree) awarded by an Italian University, with a curriculum studiorum fitting the Master Degree Course Regulations
Bachelor of Science or equivalent first cycle degree awarded by a foreign University after the completion of at least three-year course of study, will be evaluated by the Selection Committee, who decides upon degree equivalence only for this competition purposes.
- Good knowledge of the English language, at least corresponding to an intermediate level (B1 Level in the European Framework for foreign languages).

The number of students is limited to 40, with reserved quotas to EU and non-EU citizens. Students are selected based on their curriculum and interview results.

Candidate's Profile: requested capabilities and background

The courses of the Master Degree Programme in Embedded Computing Systems assume the existence of a solid background on the following topics, that characterizes the Bachelor Programmes in Computer Science and Computer Engineering of the University of Pisa:

- **Mathematics:** analytic geometry (equations for straight lines, circles, parabola, ellipses and hyperbola in the plane), differential and integral calculus in one and two variables (limits, derivatives, maxima and minima, definite integrals), series, linear algebra (matrices, vectors, determinant and solution of linear systems).
- **Physics:** kinematics and dynamics of particles, momentum, work, energy, gravitation, elastic forces, electric charge, field, potential, resistive-capacitive-inductive circuits;
- **Computer programming:** programming paradigms (functional, imperative, object-oriented), programming language practice in (at least) C or Java, static and dynamic data structures, grammars, compilers and interpreters, programming abstractions, operating systems;
- **Computer Architecture:** modular design principles, logic circuits and technologies, firmware machine level, assembler machine level, input-output management, memory hierarchies and caching, computer networking;
- **Algorithms:** basic concepts in computational problems, computational complexity, divide-et-impera, searching and ordering, dynamic programming, generation of combinations and permutations, trees, tables, randomized data and algorithms, data structures and algorithms for graphs.

Supports for students

Welcome Package for non-EU students

The University of Pisa offers to non-EU students a temporary welcome accommodation consisting in a three-month free lodging (in a shared room), and an Italian Language Course for foreigners.

The course lasts 40 hours and it will be given at the "Centro Linguistico" (CLI) of the University of Pisa.

Further information at

<http://www.unipi.it/index.php/students/item/2274-extraordinary-contributions>

Scholarship of 10,000 Euros for non-EU student

The University of Pisa offers **one scholarship of 10,000.00 Euros** which will be allocated **to the best non-EU admitted candidate** (who do not hold already a scholarship), according to the final ranking list. This scholarship will be distributed in two possible ways: as a monthly payment or as a service package including accommodation and two meals a day at the University canteen. To maintain the scholarship student must pass all the exams of the first and second semesters, earning respectively 30 and 60 ECTS credits per semester; otherwise, the scholarship will be suspended.

Further information at

<http://www.unipi.it/index.php/students/item/2274-extraordinary-contributions>

DSU contributions

Students may apply for the contributions provided by the the "Azienda della Regione Toscana per il Diritto allo Studio Universitario" (DSU - Student's Support Office). The annual call for contributions is published in the month of July at <http://www.dsu.toscana.it> (see a summary in English language of the previous call for application at: http://www.dsu.toscana.it/export/sites/default/it/documenti/doc/interventimonetari/bandi/ARD_SU_1_ING_RAT_bando_borsa_alloggio_14-15_-testo_definitivo.pdf).

DSU aids consist in scholarships (up to 1,600.00 Euros per year), lodging grants, free meals at the University canteen, tuition waivers.

Industrial partnerships

The Master has partnerships with prestigious national and international enterprises and leading research centres, which favour professional training, economical supports to students, and job opportunities during and after the Program. We mention, among the others, Ericsson, Philips, Airbus, Bosch, Magneti Marelli, Telecom, and several SMEs working in the area.

Deadlines

- non EU candidates: April 27, 2015
- EU candidates: August 29, 2015

Further information

Official website: <http://ce.iet.unipi.it/index.php/en/mecs>

Application website: <http://mecs.sssup.it/howtoapply.htm>

Contacts

Prof. Gigliola Vaglini – President of the Master Degree Council - gigliola.vaglini@iet.unipi.it

Prof. Giorgio Buttazzo – Vice-President of the Master Degree Council – buttazzo@sssup.it

Sara Andrenucci - Master Secretariat - +390502217/028-269 s.andrenucci@ing.unipi.it

Claudio Manfroni – Master Secretariat - +39 050882189 mecs@sssup.it