UNIVERSITÀ DI PISA

**MASTER DEGREE PROGRAMME IN COMPUTER SCIENCE AND NETWORKING
(LAUREA MAGISTRALE IN INFORMATICA E NETWORKING, LM-18)**

CALL FOR APPLICATIONS – A.Y. 2016 - 2017

Art. 1
*Admission to the Master Degree Programme in Computer Science and Networking
(Laurea Magistrale in Informatica e Networking, LM-18)*

1. Scuola Superiore Sant'Anna (hereafter "the *School*"), along with the University of Pisa, announces for the Academic Year 2015-2016 a public competition for admission to the Master Degree Programme in Computer Science and Networking (Laurea Magistrale in Informatica e Networking, LM-18), offered jointly by the Department of Computer Science of the University of Pisa and the Institute of Communication, Information and Perception Technologies (hereafter "the *TeCIP Institute*") of the School. Further information on the Master Degree Programme is available at **http://mcsn.sssup.it** and **http://www.di.unipi.it/it/didattica/wtw-lm**.

2. The competition aims to select at most 40 candidates, and it is divided into two sessions as follows:
  a. Up to 10 positions for non-EU applicants exclusively (citizens of countries not belonging to the European Union) and not residing in Italy (hereafter "*non-EU Applicants*")[1];
  b. Up to 30 positions for EU applicants and non-EU applicants residing in Italy exclusively (hereafter "*EU Applicants*").

3. If fewer than 10 non-EU selected applicants join the Master Degree Programme, the number of positions available for the EU applicants session will be increased by the equivalent number of positions remaining vacant in the non-EU applicants session.

4. At the end of the selection procedures, the Selection Committee will provide a final ranking list of eligible applicants for each selection session. Admitted applicants, according to the positions available for each session of the selection, will be appointed with a School's Rector Decree.

---

[1] Law n. 189/2002 art. 26: "Access to university courses is allowed however - with the same conditions as Italian students - to: students with a permit of stay for dependent employment, self-employment, family reasons, political asylum, humanitarian asylum or religious reasons; all foreigners regularly living in Italy for at least one year and with a higher qualification obtained in Italy; as well as to foreigners - wherever resident - with final diplomas from Italian schools abroad or foreign or international schools - operating in Italy or abroad - and subjected to bilateral agreements or special laws for the acknowledgment of qualifications and satisfying the general conditions required for entry to study. Citizens from Norway, Iceland, Liechtenstein, Switzerland and the Republic of San Marino are admitted under the same conditions as EU citizens. For extra-EU applicants - not residing in Italy - the relevant ministry rules applies.

Art. 2
Admission Requirements

1. By the deadlines as per art. 3 and 4 applicants must hold a Laurea di I livello (Bachelor of Science - First Cycle Degree) awarded by an Italian University, with a curriculum studiorum including at least the following minimal qualifications in terms of gained credits (CFU):

- 12 CFU overall in one or more of the following scientific-disciplinar sectors MAT/01, MAT/02, MAT/03, MAT/04, MAT/05, MAT/06, MAT/07, MAT/08, MAT/09, FIS/01, FIS/02, FIS/03;

- 60 CFU overall in one or more of the following scientific-disciplinar sectors INF/01, ING-INF/03, ING-INF/05.

a. The following *Lauree di I livello* satisfy such minimal qualifications:

- Computer Science (corresponding to *Classe 26* - Scienze e Tecnologie Informatiche, according to the Italian system of first cycle degrees classes as per DM 509/99);

- Computer Science (corresponding to *Classe L-31* - Scienze e Tecnologie Informatiche, according to the Italian system of first cycle degrees classes as per DM 270/04);

- Information Engineering (corresponding to *Classe 9* - Ingegneria dell'Informazione, according to the Italian system of first cycle degrees classes as per DM 509/99);

- Information Engineering (corresponding to *Classe L-8* - Ingegneria dell'Informazione, according to the Italian system of first cycle degrees classes as per DM 270/04).

b. Other *Lauree di I livello* awarded by an Italian University in other subjects will be also accepted provided that the applicant possesses the minimal qualifications stated above.

c. Bachelor of Science or equivalent first cycle degree awarded by a foreign University after the completion of at least three-year course of study, in one of the subjects previously listed in a) and b) or equivalent (Bachelor in Computer Science, Computer Engineering, Telecommunications, Communication Networks, Information Technology, etc.) will be evaluated by the Selection Committee, who decides upon degree equivalence only for this competition purposes. The admission of candidates holding a degree issued in a non-EU country will be conditional to the check and the legitimacy recognition of the degree, by the relevant Italian diplomatic authorities.

2. With respect to the selection reserved to non-EU Applicants, admission is extended also to applicants that have not graduated yet. In this case, a successful application will be conditional upon the subsequent awarding of a degree and the submission of adequate documentation no later than July 31, 2016.

3. With respect to the selection reserved to EU Applicants admission is extended also to applicants that have not graduated yet. In this case, a successful application will be conditional upon the subsequent awarding of a degree and the submission of adequate documentation no later than December 31, 2016.

4. In addition to the academic degree, applicants must also have a good knowledge of the English language, corresponding to at least an intermediate level (B1 Level according to the Common European Framework of Reference for Languages). The Selection Committee will verify the level of knowledge of the English language during the interview.

Art. 3
non-EU Candidates Applications

1. Applicants are requested to apply online at: **www.mcsn.sssup.it** by **April 15, 2016 at 11 am (GMT).** In case of any problem with the online application, please contact the Master Degree Secretary's Office (+39.050.882189/2105/2191, e-mail: **mcsn@sssup.it**).

2. In the application form candidates will state (self declaration):
a) family name, first name, place and date of birth, nationality, gender, marital status;
b) declaration that the candidate has never been convicted for a criminal offence or that she/he has no pending criminal proceedings;
c) declaration that the candidate holds an academic degree, as per Article 2. Applicants must specify the degree title, the University or University institute which awarded the degree, the degree course duration, the mark achieved (if applicable), the academic year in which the candidate started his/her undergraduate studies, the date of graduation. Candidates who have not graduated yet shall state the expected date of graduation (no later than July 31, 2015);
d) the Cumulative Grade Point Average;
e) declaration of knowledge of the English language (and other foreign languages) specifying duration of studies and certification obtained;
f) the permanent address and the mailing address (if different), where applicants wish to receive paper communications concerning their application. Applicants shall immediately contact the School if these addresses change as for the e-mail address, that is compulsory for the purposes of the application;
g) a valid e-mail address to receive all communications related to the application purposes, as well as a telephone number and a skype id.

3. Applicants shall also specify in which Italian Embassy or Consulate they intend to submit their pre-enrolment application in case of admission to the Course.

4. Applicants shall include in the application (all materials shall be in the Adobe pdf format and must use the file name shown):
a) **Cv_Surname_Name.pdf**: a copy of their complete *Curriculum Vitae et Studiorum* (in English or Italian) covering their education programme, cultural and professional experiences and all other information that might help in the evaluation of the candidate;
b) **Certificate_Surname_Name.pdf**: copy of Degree Certificate (if applicable) and its translation if written in language other than English or Italian;
c) **Transcripts_Surname_Name.pdf**: the academic transcripts with the full list of courses and grades (in English or Italian). This list shall contain information regarding credits, units (or equivalent) received, the grades received for each class taken, and the date when the final examination (if applicable) was taken, provided by attaching the copy of the University Transcripts;
d) **Achievements_Surname_Name**: a list of competences and skills acquired by the candidate during his/her academic and professional experience, and deemed to be crucial for the admission to the Master Degree Programme (no more than 2.000 characters);
e) **Passport_Surname_Name.pdf**: copy of valid passport or any other international ID;
f) **English_Surname_Name.pdf** (not mandatory): if available, a copy of an English Language knowledge certification;
g) **Other_Surname_Name.pdf** (not mandatory): a copy of any other document or information that they deem suitable (works written in languages other than Italian, English, or French must be accompanied by a summary in one of the above languages).

According to art. 46 and 47 of D.P.R. n. 445/2000, Italian citizens and EU citizens are allowed to submit self-declarations. Non-EU citizens legally residing in Italy are allowed as well, only with reference to information and facts which can be certified or attested by Italian public bodies.

5. **<u>Applications with missing information will not be considered valid</u>**. Integrations to the application after the call deadline will not be accepted in whatsoever circumstance.

6.   The School and the University of Pisa are entitled to check the truthfulness of the declarations and the documentation submitted by the candidates, and may require the submission of original documents. In case of false statements the School can decide at any time, by justified Rector Decree, the exclusion of the candidate from the selection procedure without prejudice to the resulting criminal law liability.

<div align="center">

Art. 4
EU Candidates Applications

</div>

1. The section of the competition reserved to EU Applicants is structured into two sessions. Each session provides up to 15 positions. If less than 15 applicants join the Master Degree Programme in the first session, the remaining positions will be added to the 15 positions of the second session. Non-eligible applicants in the first session may apply for the second session, only if substantial upgrades of their *curriculum studiorum* have occurred. The Selection Committee decides upon the relevance of the above-mentioned upgrades, for the admission of these applications to the second session.

2. Applicants are requested to apply online at: **http://mcsn.sssup.it.** In case of any problem with the online application, please contact the Secretary's Office (+39.050.882189/91/05, e-mail: **mcsn@sssup.it**)**.**

3. Deadlines provided for EU Applicants are the following:
   - first session: **April 28, 2016 at 11:00 am (GMT)**
   - second session: **August 1, 2016 at 11:00 am (GMT)**

4. In the application form candidates will state (self declaration):
   a) family name, first name, place and date of birth, nationality, gender, marital status;
   b) declaration that the candidate has never been convicted for a criminal offence or that she/he has no pending criminal proceedings;
   c) declaration that the candidate holds an academic degree, as per Article 6;
   d) the Cumulative Grade Point Average;
   e) declaration that the candidate holds an academic degree, as per Article 2. Applicants must specify the degree title, the university or university institute which awarded the degree, the degree course duration, the mark achieved (if applicable), the academic year in which the candidate started his/her undergraduate studies, the date of graduation. Candidates who have not graduated yet shall state the expected date of graduation (no later than December 31, 2015);
   f) the permanent address and the mailing address (if different), where applicants wish to receive paper communications concerning the application. Applicants shall immediately contact the School if these addresses change as for the e-mail address, that is compulsory for the purposes of the application;
   g) a valid e-mail address to receive all communications related to the application purposes, as well as a telephone number and a skype id.

5. Applicants shall include in the application (all materials shall be in the Adobe pdf format and must use the file name shown):

a) **Cv_Surname_Name.pdf**: a copy of their complete *Curriculum Vitae et Studiorum* covering their education programme, cultural and professional experiences and all other information that might help in the evaluation of the candidate;

b) **Certificate_Surname_Name.pdf**: copy of Degree Certificate (if applicable) and its translation if written in language other than English or Italian;

c) **Transcripts_Surname_Name.pdf**: the academic transcripts with the full list of courses and grades (in English or Italian). This list shall contain information regarding credits, units (or equivalent) received, the grades received for each class taken, and the date when the final examination (if applicable) was taken, provided by attaching the copy of the University Transcripts;

d) **English_Surname_Name.pdf** (not mandatory): if available, a copy of an English Language knowledge certification;

e) **Passport_Surname_Name.pdf**: copy of valid passport or any other international ID;

f) **Other_Surname_Name.pdf** (not mandatory): a copy of any other document or information that they deem suitable (works written in languages other than Italian, English, or French must be accompanied by a summary in one of the above languages);

According to art. 46 and 47 of D.P.R. n. 445/2000, Italian citizens and EU citizens are allowed to submit self-declarations. Non-EU citizens legally residing in Italy are allowed as well, only with reference to information and facts which can be certified or attested by Italian public bodies.

6. <u>Applications with missing information will not be considered valid</u>. Integration to the application after the call deadline will not be accepted in whatsoever circumstance.

7. The School and the University of Pisa are entitled to check the truthfulness of the declarations and the documentation submitted by the candidates, and may require the submission of original documents. In case of false statements the School can decide at any time, by justified Rector Decree, the exclusion of the candidate from the selection procedure without prejudice to the resulting criminal law liability.

<div align="center">

Art. 5
Selection of Applicants

</div>

1. Applicant selection will involve, in both sessions, the assessment of all submitted documents and an interview. The selection process aims to evaluate each applicant's background and education, assessing those potential skills required when attending an interdisciplinary and innovative educational programme.

2. The Selection Committee, which will be the same for both selection sessions, is jointly nominated by the Director of the Department of Computer Science of the University of Pisa and the Director of the TeCIP Institute, and appointed with a School's Rector decree.

3. The final assessment will be on a hundred-point scale:
   a. up to 70 points for titles evaluation;
   b. the remaining 30 points for the interview.

4. The titles evaluation will be focused on the curriculum vitae et studiorum of the candidates, titles submitted and attended courses. Admission to the interview is granted with a score of at least 49 points.

5. For the session reserved to non-EU applicants, the interviews will be held via videoconference (using Skype software or similar tools at the Selection Committee's discretion) at Italian Embassies, Consulates or other locations identified by the Selection Committee in order to assure the fulfilment of the applicants' identification procedures. If the interview is not attended at Embassies or Consulates, the candidate must exhibit, before starting the interview, the ID submitted in the online application.

6. For the session reserved to EU applicants, the interviews will be held in Pisa at the School premises. Candidates may ask the Selection Committee, due to proper and justified reasons, to hold the interview through videoconference (using Skype software or similar tools at the Selection Committe's discretion). In this case, the candidate, must exhibit, before starting the interview, the ID submitted in the online application.

7. A candidate not attending the interview within the scheduled slot assigned will be excluded from the final ranking list.
If the interview is held through videoconference, the candidate is in charge of ensuring the availability of the required hardware (PC, webcam) and software, and a reliable internet connection.

8. During the interview, the Selection Committee will examine the candidates' profiles on the basis of submitted titles, and will verify the existence of a solid background knowledge as per Annex 1, as well as the candidate English knowledge level.

Applicants shall obtain at least 21/30 points in order to be included in the final ranking.

9. A final minimum score of 70/100 is therefore necessary to successfully pass the examination and be eligible for admission to the Master Degree Programme.

Art. 6
Selection schedule and results

1. Selections will be held according to the following schedule:

    a)   **non-EU Applicants**
        assessment of submitted documentation: within April 29, 2016
        interview: May 5 and 6, 2016
        final ranking list of eligible applicants: within May 13, 2016

    b)   **EU Applicants (first session)**
        assessment of submitted documentation: within May 18, 2016
        interview: May26 and 27, 2016
        final ranking list of eligible applicants: within May 31, 2016

    c)   **EU Applicants (second session)**
        assessment of submitted documentation: within September 5, 2016
        interview: September 12 and 13, 2016
        final ranking list of eligible applicants: within September 16, 2016

2. The results of the assessment of submitted documentation will be published on **http://mcsn.sssup.it**, with the list of the applicants admitted to the interview and all information regarding the place, time and date of the interview. Final ranking lists will be published as well on **http://mcsn.sssup.it**.

Art. 7
Ranking Lists and Admitted Applicants

1. Admitted applicants are nominated with a School's Rector Decree according to the selection ranking, covering all available positions for each session of the competition.

2. Eligible EU applicants not admitted to the Master Course within the first session of the selection and not applying for the second session will be automatically inserted in the second session ranking, with the score obtained in the first session.

3. If a candidate renounces the position offered, the next eligible candidate in the ranking list will be called.

4. Non-EU admitted candidates will be requested to send their written assent to the Master Secretary's Office. and they must contact the relevant Italian Embassy or Consulate in order to pre-enroll in the "Laurea Magistrale in Informatica e Networking (LM-18)" programme offered by the University of Pisa. Pre-enrolment terms and conditions are reported on the website: **http://www.studiare-in-italia.it/studentistranieri/**.

5. Applicants that have not graduated yet, as referred on art. 2, point 2 and 3, are admitted under condition. Their matriculation is conditional upon the awarding of a degree and the submission of the achievement documentation no later than the given deadlines.

Art. 8
Matriculation

1. Admitted applicants shall matriculate at the University of Pisa according to the terms and conditions which will be communicated after the publication of the ranking list on the website of the School. Admitted applicants holding a non-Italian degree shall enclose, with the matriculation application, the original academic title, the official translation of the degree into Italian, the relevant consular legalisation of the foreign title, along with the "Dichiarazione di Valore" (Declaration of Value) issued by the Italian diplomatic representative in the country to which the educational system of the university issuing the diploma belongs.
As an alternative, if the degree was issued along with a Diploma Supplement, it will be possible to submit this document, legalised by the relevant authorities, instead of the "Dichiarazione di Valore".

Art. 9
Tuition fee, Contributions and Study Awards

1. Tuition fee depends on family income and country of provenience of the students, according to the rules of the University of Pisa (please consult the webpage: **https://www.unipi.it/index.php/tuition-fees-and-financial-support**).

2. 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)[2]. The annual call for contributions is published in the month of July at **http://www.dsu.toscana.it**.

---

[2] DSU contributions consist of scholarships, lodging grants, meals at the University canteen, tuition waivers.

3. In order to encourage the participation of international applicants, the University offers to foreign students, with priority to non-EU students, a one-month free accommodation (in a shared room), which may be extended to three months, and a free forty-hour Italian language course, which will be given at the "Centro Linguistico" (CLI) of the University[3]. The University provides further benefits for students with Vietnamese, Indonesian and Latin-American nationality.
Further information is available at **https://www.unipi.it/index.php/students**.

4. The University may reserve a certain number of merit awards to foreign students with the best academic performance at the end of the first year.

5. The School will cover the National Health System registration fees for the year 2017 of non-EU students eligible for contributions provided by DSU in the a.y. 2016/17, and the National Health System registration fees for the year 2018 of non-EU students eligible for contributions provided by DSU in the a.y. 2017/18.

6. In order to encourage the participation of deserving students the TeCIP Institute of the School and the Department of Computer Science of the Universtity of Pisa respectively contribute with 3 and 1 study awards of 2,000.00 Euros gross each. The awards will be assigned to 4 students enrolled in the second year who will achieve the best academic performance at September 30, 2017.
The awards will be assigned through a subsequent call.
The above mentioned contributes are not cumulable.

7. If additional funds should be available before the beginning of the Programme, further grants may be assigned by the School and the University of Pisa.

---

[3] Free accommodation and Italian Course will be available only for selected candidates sending a scan copy of the Declaration of Value, or the Diploma Supplement legalised by the relevant authorities, before their arrival in Pisa,. Students enrolling in the Master Degree Course within the first month of their stay in Italy, are allowed to extend free accommodation to three months.

Person in charge of the Procedure:
Dr. Silvia Marcacci, Responsible of the U.O. Ph.D-Lauree Magistrali of Scuola Superiore Sant'Anna – Palazzo Toscanelli, Via Santa Cecilia, 3 – 56127 Pisa – tel. 050/883528 - fax 050/883519 - e-mail: s.marcacci@sssup.it.

Treatment of Personal Data
The personal data supplied by the applicants will be mainly processed automatically by the Scuola Superiore Sant'Anna and in accordance with Art. 11 of the Legislative Decree No. 196/2003 ("Code Concerning the Protection of Personal Data") for the management of the competition procedure. The data may also be used in anonymous form for statistical purposes. Personal data supply is essential for the participation to the selection. Anyone interested can, at any time, exercise the rights provided by Art. 7 of the above-mentioned Legislative Decree, by writing to the Scuola Superiore Sant'Anna, U.O. PhD-Lauree Magistrali, Via Santa Cecilia, 3, 56127 Pisa (Italy).

Measures of Prevention of Corruption
The Scuola operates in compliance with Law No. 190/2012 concerning the prevention of corruption by implementing measures identified in the "Three-year anti-corruption plan" published in the section "Transparency in Administration" of the Scuola website at:
http://santannapisa.it/it/ateneo/amministrazione-trasparente/amministrazione-trasparente

REGULATORY REFERENCES:
Equivalence and recognition of foreign degrees: art. 2, L. 148/2002; art. 6, DM 270/2004
Self-declarations: DPR no. 445/2000 and subsequent modifications and supplements

Candidate's Profile: requested capabilities and background
 The courses of the Master Degree Programme in Computer Science and Networking assume the existence of a solid background knowledge at the methodological and technological level, that characterizes the Bachelor Programmes in Computer Science and in Computer Engineering of the University of Pisa.

The applicants are strongly recommended to verify their background level with respect to the topics and subjects indicated below, and to follow the suggestions about recommended readings. The first-year courses in Computer Science and Networking will assume that the student knows such Bachelor-level teaching material, or equivalent teaching material. The teachers of University of Pisa and Scuola Superiore Sant'Anna can be contacted for advising the applicants and the selected students.

It is required that the students in Computer Science and Networking possess good abilities of analysis and synthesis, as well as a scientific method of studying and problem solving capabilities.

The basic concepts and principles of *continuous and discrete Mathematics and Calculus* are necessary, in particular about real and complex numbers, series, limits, derivatives, integrals, logical-deductive reasonings, propositional logics and proof techniques, set, relations, functions, induction and recurrence, factorization, probability theory, and linear algebra.

All the basic disciplines in Computer Science and Engineering belong to the required background. In particular, a solid Bachelor-level knowledge is required in

- Programming Languages and Methodologies,
- Computer Architecture,
- Algorithms,
- Communication Networks,

both from a methodological viewpoint and from a design practice viewpoint.

The needed background in *Programming* includes programming paradigms (functional, imperative, object-oriented), basic concepts in semantics, programming language practice in (at least) C and Java, static and dynamic data structures, grammars, compilers and interpreters, program designing and verification, advanced programming abstractions, abstract machines and run-time supports. This required background is contained in the following recommended readings:

- Michael L. Scott, *Programming Language Pragmatics*, Third Edition, Morgan-Kaufmann, 2009
- B. Liskov (with J. Guttag), *Program Development in Java: Abstraction, Specification and Object-Oriented Design*, Addison-Wesley, 2001

The needed background in *Computer Architecture* includes basic concepts in system level structuring and modular design principles, logic circuits and technologies, firmware machine level, assembler machine level, processes and their run-time support, operating systems functionalities, input-output, memory hierarchies and caching, instruction level parallelism. In the University of Pisa such concepts and techniques are studied according to a Structured Computer Architecture approach and stressing the issues of performance evaluation, cost model and design techniques. This required background is contained in the following recommended readings:

- Marco Vanneschi, *Appendix on Structured Computer Architecture* belonging to the textbook "High Performance Computing: Parallel Processing Models and Architectures", Pisa University Press, 2014. Similar material is also available at http://www.di.unipi.it/~vannesch/, section Teaching – High Performance Computing 2013-14*: Course Notes - Part 0 - Backgroud on Structured Computer Architecture*. These Notes have been expressly written for Computer Science and Networking students, and are based on the Italian book "Architettura degli Elaboratori", Pisa University Press.
- Other reference books are

- o D.A. Patterson, J.L. Hennessy, *Computer Organization & Design – The Hardware/Software Interface.* Morgan Kaufmann Publishers.;
- o A. Tanenbaum, "*Structured Computer Organization*", Prentice-Hall.

The needed background in *Algorithms* includes basic concepts in computational problems, tractability and undecidability, computational complexity, divide-et-impera, searching and ordering, dynamic programming, generation of combinations and permutations, greedy computations, trees, dictionaries, tables, randomized data and algorithms, data structures and algorithms for graphs. This required background is contained in the MIT lectures available at:

- http://didawiki.cli.di.unipi.it/doku.php/magistraleinformaticanetworking/ae/ae2012/start.

and in the book:

- T. Cormen, C. Leiserson, R. Rivest, C. Stein. *Introduction to Algorithms.* MIT Press, third edition, 2009, chapters 2, 3, 4, 6, 7, 8, 10, 11 (no perfect hash), 12 (no randomly built), 15 (no optimal BST), 18, 22 (no strongly connected components).

The needed background in *Communication Networks* includes basic concepts and techniques in technologies for packet switching networks, protocol layers with specific examples of existing products and frameworks, application layer, transport layer, network layer, link layer, wireless LAN, introduction to security issues. This required background is contained in

- A. Leon-Garcia, I. Widjaja, *Communication Networks*, Mc Graw Hill, chapters 1, 2, 3
- J.F. Kurose & K.W. Ross. *Computer Network and Internet.* Pearson, chapter 1
- A. Tanenbaum, *Computer Networks*, Prentice Hall, chapter 1, 2

In addition it is encouraged to get familiar with some elements in physics of electromagnetism (electricity phenomena and basics of geometric optics) , that can be found in any physics textbook.