UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2019/20
BACHELOR
Computer Science (Classe L-31)
enrolled from academic year 2018/19

HEADING	
Degree classification - Denomination and code:	L-31 Computer science
Degree title:	Dottore
Length of course:	3 years
Total number of credits required to complete programme:	180
Years of course currently available:	1st , 2nd
Access procedures:	Cap on student, student selection based on entrance test
Course code:	F1X

PERSONS/ROLES

Head of Study Programme
Prof. Giovanni Pighizzini

Degree Course Coordinator
Prof. Walter Cazzola

Tutors - Faculty
Nicola Basilico, Paolo Boldi, Andrea Lanzi, Alberto Momigliano, Stefano Montanelli, Anna Chiara Giovanna Morpurgo, Massimo Santini, Andrea Mario Trentini, Andrea Visconti.

Degree Course website
https://informatica.cdl.unimi.it/
http://www.unimi.it/studenti/matricole/77516.htm

Via Celoria 18 - 20133 Milano Phone 0250316250/252 https://informatica.cdl.unimi.it/ Email: segreteria.didattica@di.unimi.it

Via Celoria 18 - 20133 Milano http://www.di.unimi.it/ecm/home/organizzazione/organi-di-governo/altre-commissioni/content/piani-di-studio.0000.UNIMIDIR Email: piani.studio@di.unimi.it

international.students@unimi.it

Via Celoria 18 - 20133 Milano Phone 199 188 128 https://www.unimi.it/it/studiare/servizi-gli-studenti/segreterie-infostudenti
https://www.unimi.it/it/studiare/servizi-gli-studenti/segreterie-infostudenti/sedi-e-orari-segreterie-studenti

CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

The goals of the degree course in Computer Science are: on the one hand to provide a solid basic and methodological knowledge of the main sectors of computer science and mathematics and on the other to provide a good command of the methodologies and technologies of Computer Science, offering adequate background to learn and know the different application areas of the discipline and to be able to assimilate, understand and evaluate the impact of the constant scientific and technological progress in the discipline. The degree program provides a broad common basis of activities, all aimed at preserving the homogeneity and cultural coherence expected of a Computer Science graduate. It is also given to the student a certain amount of freedom in the choice of a part of the courses in order to further investigate some topics of their own interest among those proposed by the course of study. For the realization of all the training objectives set out above, frontal lessons, practical exercises, labs and IT tools to support teaching are provided.

Expected learning outcomes

Acquisition of knowledge related to theoretical and applied computer science and its basic scientific fields:
- programming knowledge: procedural and object-oriented programming languages, problem solving, software engineering;
- knowledge of theoretical computer science: algorithms and data structures, formal languages;
- knowledge of architectures and systems: computer architectures, operating systems, databases, computer networks;
- mathematical knowledge: discrete mathematics, calculus, probability and statistics, mathematical logic.

Acquisition of methodological, technological and instrumental skills in the field of information sciences and their

applications:
- scientific method: learning and use of the scientific method both through frontal lessons and through labs;
- modeling skills: ability to use advanced tools in the modeling of systems on various scales, from "large" systems up to applications that also require knowledge of hardware aspects and awareness of signal transmission problems;
- operational skills: ability to program a computer with different programming languages and in different application areas (scientific applications, commercial applications and industrial applications), ability to operate with the most popular operating systems and to configure network environments, capacity to apply computer security techniques;
- use of modern technologies: use of programming environments and tools, ability to use tools for configuring and managing systems and networks, ability to use tools for managing databases;
- ability to work in a group: developed in laboratory courses, during exercises and preparation of final tests for labs and within research groups, during work for the preparation of the final thesis.

Acquisition of conscious judgment autonomy through:
- autonomous execution of laboratory projects;
- relationship with teachers in the field of training activities and preparation of the final thesis;
- choice and preparation of the final thesis;
- ability to evaluate the impact of information technology on the ethical and social level.

Acquisition of adequate communication skills through:
- the acquisition of communication tools of various kinds (multimedia, online, etc.);
- the relationship with the teachers during internships;
- seminar activities in complementary courses;
- presentation of the final thesis;
- the study of a foreign language;
- participation in seminars and conferences hosted by the university's research facilities.

Acquisition of adequate learning skills for the development and deepening of further abilities, with reference to:
- research and consultation of bibliographic material for the preparation of exams and the final thesis;
- use during the courses and in the preparation of the final paper of databases, electronic journals and basic knowledge tools for the continuous updating of knowledge;
- achievement of a basic preparation and of an autonomy of study that allows the graduate to consult advanced textbooks and journals specialized in the research sectors characterizing Computer Science and scientific disciplines.

Professional profile and employment opportunities

The type of role that the degree course in Computer Science intends to train with a view to immediate placement is that of a graduate capable of collaborating with technical, operational and professional tasks in consultancy, analysis, design , management, maintenance, marketing of small and medium-sized IT systems. Graduates will be able to operate in the most varied application fields for the design and management of IT and telematic systems and for the study of new systems and applications.
This activity can be carried out in all areas of the public and private sector that use information technology. Therefore the main market segments concerned are: banks, insurance companies, logistics and transport, healthcare, public administrations, telecommunications and media, service companies, industry. More precisely, the graduate's specific roles and jobs, according to the ISTAT code, are listed below.
3.1.2 IT, telematics and telecommunication technicians
3.1.2.1 Programmer technicians
3.1.2.2 Application expert technicians
3.1.2.3 Web technicians
3.1.2.4 Database manager technicians
3.1.2.5 Network and telematic system manager technicians

The course allows to qualify for the following regulated professions: junior information engineer; graduate industrial expert.

Notes

In order to get their degree, students are required to certify their knowledge of the English language at the B1 level. This level can be certified in one of the following ways:
- By submitting their language certificate, taken no more than 3 years before its submittal and attesting a B1 or higher level (for the list of the language certificates which are accepted by the University of Milan, please refer to the website: http://www.unimi.it/studenti/100312.htm).
Students can submit their language certificate during the immatriculation procedure or send it to the Language Centre of the University of Milan (SLAM) via the Infostudente service.
- By sitting the placement test run by SLAM, during the first year exclusively, from September to December. Should they not pass the Placement Test, students will have to attend the English language course organized by SLAM. All students who do not have a valid language certificate must sit the Placement Test. Those students who do not sit the Placement test by December or do not pass the end of course test in one of the 6 attempts granted will have to get a language certificate outside the University of Milan within their degree.

EXPERIENCE OF STUDY ABROAD AS PART OF THE TRAINING PROGRAM

The University of Milan supports the international mobility of its students, offering them the opportunity to spend periods of study and training abroad, a unique opportunity to enrich their curriculum in an international context.

Study and internships abroad

The education program can be enriched by educational activities abroad both to deepen some topics and as socialization experience in international environments. WIthin the Erasmus+ program study periods can be taken in over 50 universities in Belgium, Finland, France, Germany, Greece, Lithuania, Norway, Netherlands, Poland, Portugal, Czech Republic, Romania, Spain, Switzerland, Hungary. Courses will be recognized in the personalized study plan. These periods abroad are typically 5-month long and include courses for about 30 CFU, in the area of information and communication technology and related applications. Recognition of these educational activities will be based on the Learning Agreement, to be defined in advance by the student and the Erasmus coordinator at the Computer Science Department before starting the period abroad: course in the learning agreement with passed exams will replace the educational activities of the study plan ("manifesto"), either by covering the same topics or complementing the acquired basic competences. The Erasmus Committee at the Computer Science Department will perform the recognition of CFU obtained abroad and the definition of the personalized study plan. Similarly, stages to prepare the final dissertation are allowed in the same foreign universities. Recognition will be performed by the Department Erasmus Committee.

How to participate in Erasmus mobility programs

To gain access to mobility programs for study purposes, lasting 3-12 months, the enrolled students of the University of Milan must attend a public selection that starts usually around the month of February each year through the presentation of specific competition announcements, which contain information on available destinations, respective duration of the mobility, requirements and deadlines for submitting the online application.

The selection, aimed at evaluating the proposed study abroad program of the candidate, knowledge of a foreign language, especially when this is a preferential requirement, and the motivations behind the request, is performed by specially constituted commissions.

Each year, before the expiry of the competition announcements, the University organises information sessions for the specific study course or groups of study courses, in order to illustrate to students the opportunities and participation rules.

To finance stays abroad under the Erasmus + program, the European Union assigns to the selected students a scholarship that - while not covering the full cost of living abroad - is a useful contribution for additional costs as travel costs or greater cost of living in the country of destination.

The monthly amount of the communitarian scholarship is established annually at national level; additional contributions may be provided to students with disabilities.

In order to enable students in economic disadvantaged conditions to participate in Erasmus+ program, the University of Milan assigns further additional contributions; amount of this contributions and criteria for assigning them are established from year to year.

The University of Milan promotes the linguistic preparation of students selected for mobility programs, organising every year intensive courses in the following languages: English, French, German and Spanish.

The University in order to facilitate the organisation of the stay abroad and to guide students in choosing their destination offers a specific support service.

More information in Italian are available on www.unimi.it > Studenti > Studiare all¿estero > Erasmus+

For assistance please contact:
Ufficio Accordi e relazioni internazionali
via Festa del Perdono 7 (ground floor)
Tel. 02 503 13501-12589-13495-13502
Fax 02 503 13503
E-mail: mobility.out@unimi.it
Desk opening hour: Monday-friday 9 - 12

1st COURSE YEAR Core/compulsory courses/activities common

Learning activity	Ects	Sector
AUTOMATA AND FORMAL LANGUAGES	6	INF/01
COMPUTER ARCHITECTURE I	6	INF/01
COMPUTER ARCHITECTURE II	6	INF/01

COMPUTER PROGRAMMING		12	INF/01
CONTINUUM MATHEMATICS		12	MAT/09, MAT/01, MAT/02, MAT/03, MAT/04, MAT/05, MAT/06, MAT/07, MAT/08
DISCRETE MATHEMATICS		6	MAT/09, MAT/01, MAT/02, MAT/03, MAT/04, MAT/05, MAT/06, MAT/07, MAT/08
English assessment B1 (3 ECTS)		3	L-LIN/12
MATHEMATICAL LOGIC		6	MAT/01, INF/01
	Total compulsory credits	57	

2nd COURSE YEAR Core/compulsory courses/activities common

Learning activity		Ects	Sector
ALGORITHMS AND DATA STRUCTURES		12	INF/01
COMPUTER PROGRAMMING II		6	INF/01
DATABASES		12	INF/01
OPERATING SYSTEMS		12	INF/01
STATISTICS AND DATA ANALYSIS		6	INF/01
	Total compulsory credits	48	

3rd COURSE YEAR (available as of academic year 2020/21) Core/compulsory courses/activities common

Learning activity		Ects	Sector
COMPUTER NETWORKS		12	INF/01
SOFTWARE ENGINEERING		12	INF/01
	Total compulsory credits	24	

Further elective courses

Courses of the following Table 1, from which 12 CFU must be chosen, can be used by the student to complete his / her education both with respect to the physical-mathematical fundamentals (Physics, Operational research), and with respect to more specific topics to computer science disciplines (Languages programming, security and privacy).

OPERATIONS RESEARCH	6	MAT/09
PHYSICS	6	FIS/03, FIS/02, FIS/01
PROGRAMMING LANGUAGES	6	INF/01
SECURITY AND PRIVACY	6	INF/01

Studentes must obtain 6 credits by choosing from the courses of Table 1 and Table 2 below.

BUSINESS PROCESS MANAGEMENT	6	INF/01
CRYPTOGRAPHY I	6	INF/01
DECLARATIVE PROGRAMMING	6	INF/01
DIGITAL IMAGE PROCESSING	6	INF/01
EMBEDDED SYSTEMS	6	INF/01
INFORMATION SYSTEMS	6	INF/01
LANGUAGES AND COMPILERS	6	INF/01
MULTIMEDIA PUBLISHING	6	INF/01
SCIENTIFIC VISUALIZATION	6	INF/01
TECNOLOGIES AND LANGUAGES FOR WEB	6	INF/01

Free choice courses.

Students will have to achieve 12 free cfu among the courses of the previous tables, among the following courses activated by the Department, or among all the courses activated by the university.

Students can request the recognition of credits for training activities at external institutions, presenting a certification. Each certification can give rise to a maximum of 3 credits, and up to 2 certifications can be recognized. The students who intend to request the recognition of the certifications must complete the "application" form available on the page http://www.unimi.it/studenti/segreterie/963.htm and send ver to the secretary of his / her degree together with a copy of the certifications achieved.

The evaluation will be carried out by a special commission based on the following parameters:

- Validity: the certification must have been obtained for a maximum of 5 years.

- Specificity: the object of the certification must be those referable to those required by the degree course in which the student is regularly enrolled.

- Specialization: the certification must concern specialized and / or professional skills.

- Level: the certification must attest to skills of a medium or advanced level. Basic and entry level certifications are excluded.

ADDITIONAL COURSES ACTIVATED BY THE EDUCATIONAL EDUCATIONAL COLLECTION OF INFORMATICS AVAILABLE FOR THE FREE SELECTION:

FUNDAMENTALS OF DIGITAL SOCIAL MEDIA	6	INF/01
SIGNAL PROCESSING	6	INF/01

End of course requirements

ECONOMICAL, ETHICAL, SOCIAL, AND LEGAL ASPECTS OF IT	3	NA
FINAL EXAM	3	NA
TRAINING	15	NA

	Total compulsory credits	21	

COURSE PROGRESSION REQUIREMENTS

The course contains the following obligatory or advised prerequisites

Learning activity	Prescribed foundation courses	O/S
COMPUTER PROGRAMMING II	COMPUTER PROGRAMMING	Core/compulsory
OPERATIONS RESEARCH	CONTINUUM MATHEMATICS	Recommended
	DISCRETE MATHEMATICS	Core/compulsory
DATABASES	COMPUTER PROGRAMMING	Core/compulsory
ALGORITHMS AND DATA STRUCTURES	COMPUTER PROGRAMMING	Core/compulsory
	CONTINUUM MATHEMATICS	Recommended
	DISCRETE MATHEMATICS	Recommended
PROGRAMMING LANGUAGES	ALGORITHMS AND DATA STRUCTURES	Recommended
	COMPUTER PROGRAMMING	Core/compulsory
COMPUTER ARCHITECTURE II	COMPUTER ARCHITECTURE I	Recommended
SECURITY AND PRIVACY	COMPUTER NETWORKS	Recommended
	OPERATING SYSTEMS	Recommended
STATISTICS AND DATA ANALYSIS	CONTINUUM MATHEMATICS	Core/compulsory
	DISCRETE MATHEMATICS	Recommended
OPERATING SYSTEMS	COMPUTER PROGRAMMING	Core/compulsory
	COMPUTER ARCHITECTURE II	Recommended
SOFTWARE ENGINEERING	COMPUTER PROGRAMMING	Core/compulsory