UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2026/27
BACHELOR
COMPUTER SYSTEM AND NETWORKS SECURITY (Classe L-31 R)
Enrolled in 2026/27

HEADING

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

PERSONS/ROLES

Head of Study Programme
Prof.ssa Sabrina Gaito

Degree Course Coordinator
Prof. Marco Anisetti

Tutors - Faculty
TUTOR PER L'ORIENTAMENTO:
Claudio Agostino Ardagna
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Degree Course website
https://ssri.cdl.unimi.it/

Via Celoria 18 - 20133 Milano https://di.unimi.it/it/dipartimento/organizzazione/commissioni Email: orientamento.uscita@di.unimi.it
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https://di.unimi.it/it/dipartimento/segreterie-e-servizi/ufficio-la-didattica https://informastudenti.unimi.it/saw/ess?AUTH=SAML

CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

The degree aims to provide future graduates in Computer Systems and Network Security with a broad, solid and in-depth cultural, technological and methodological preparation in the IT area, with specific attention to the issues of security and privacy to enable them to address all the issues related to the creation of secure services/software at an infrastructural and application level.

The degree course aims to provide a solid basic mathematical and methodological cultural preparation in order to: i) know and master the foundational aspects of computer systems, ii) familiarize themselves with the basics of the scientific method, iii) analyze problems and develop computer models and solutions independently or in work groups, iv) possess adequate technological skills to support the various applications, v) understand and evaluate the impact, including ethical, of constant scientific and technological progress in the discipline itself, vi) develop communication skills relating to the solutions developed and the problems faced, suitable for both specialist and non-specialist interlocutors.

The degree course also aims to provide specific skills in the field of security and privacy. In particular, it aims to i) provide skills to understand the evolution of threats to security and privacy also by consulting advanced scientific and regulatory documentation, in order to apply specific countermeasures and protection tools, especially in the context of modern web/cloud and mobile system networks, ii) develop skills for the development of secure software and infrastructure solutions, iii) develop skills in the field of corporate management/organization of IT security.

Expected learning outcomes

Knowledge and understanding

Acquisition of fundamental and contextual theoretical knowledge, as well as application aspects related to the development of IT systems. This acquisition will be guaranteed by specific mandatory courses and verified within the same courses. In particular:
- mathematical knowledge such as discrete mathematics, continuum mathematics, probability calculus and statistics
- fundamental knowledge of computer science such as algorithms, data structures, notions of computational complexity
- programming knowledge such as procedural and object-oriented programming languages
- knowledge of computer architectures and systems such as computer architectures, operating systems, computer networks, databases
- knowledge of the scientific investigation method and its implications, including ethical ones
- knowledge of the economic, legal, ethical, social and environmental implications of digital transformation

Acquisition of knowledge relating to the applications of computer security, including:
- methodological and operational knowledge in the following fundamental fields of computer security and data and service protection: cryptography, network security, data protection, processing of personal and sensitive data, management of computer incidents
- knowledge of techniques for the study, modeling and design of secure software architectures
- knowledge of the principles, methods and tools for the design, development and analysis of computer systems to ensure their security/privacy
- knowledge and understanding of organizational issues and solutions related to the processing of sensitive data and information security, including knowledge of legislation and international standards

Assessment methods: the acquisition of such knowledge and skills is assessed at the end of the courses and the entire course of study. The assessment of individual learning results from a combination of factors inherent to the acquisition of methodological and technological knowledge and skills in the field of information security.

Ability to apply knowledge and understanding

Acquisition of methodological, technological and instrumental skills and competences in the field of computer science and its applications to the field of cyber security. The skills indicated here are also developed and verified in various courses, also with respect to exercise/laboratory activities and project activities where foreseen as an integral part of the course for which this is appropriate. In particular:
- knowing how to apply the scientific investigation method
- having the ability to analyze and model problems through knowledge of foundational and contextual aspects related to the development of computer systems in the three production sectors;
- be able to use analysis and modeling techniques for secure systems on various scales
- be able to design, develop and verify applications and computer systems related to the three production and scientific sectors, paying particular attention to security and privacy
- ability to evaluate, model and implement solutions in a corporate context for compliance with national and international data protection regulations
- be able to operate with the most common operating systems and be able to configure network environments, with particular attention to their security; be able to use tools for database management

Assessment methods: the acquisition of such knowledge and skills is assessed at the end of the courses and the entire course of study. The assessment of individual learning results from a combination of factors relating to the acquisition of methodological and technological knowledge and skills in the field of computer security.

Making judgments

Acquisition of conscious autonomy of judgment in order to achieve autonomous decision-making skills in the field of analysis, design, development, implementation, evaluation and management of IT applications on various scales and in different fields, both scientific and industrial, with particular attention to those concerning cyber security; these skills are acquired both as part of the cultural background provided by the teachings and during the internship. In particular:
- being able to predict and manage the economic, legal, ethical, social and environmental sustainability implications of one's professional activities and digital transformation
- knowing how to operate autonomously by applying one's knowledge in concrete situations, linked to scientific, professional, industrial/business and institutional fields and contexts
- ability to develop autonomous and independent reasoning and reflections
- ability to critically evaluate alternative design and implementation choices

- ability to evaluate and interpret objective and subjective experimental data

Assessment methods: the acquisition of such knowledge and skills is assessed at the end of the teachings and of the entire study path. The assessment of individual learning is the result of a combination of factors related to the acquisition of methodological and technological knowledge and skills in the field of cybersecurity.

Communication skills

Acquisition of adequate communication skills. These skills are acquired in the group project activities that are part of the final assessment of some courses, and during the internship and the final exam. In particular:
- ability to communicate effectively with users and experts in the application domains of interest by interacting in interdisciplinary work groups through knowledge of the different technical and scientific languages and communication methods
- have relational and decision-making skills and know how to work effectively both by organizing and participating in work groups
- know how to communicate effectively, in written and oral form, using the specific vocabulary of scientific disciplines and the different IT and engineering application fields
- be able to promote and manage the digitalization of processes in the three production sectors
Assessment methods: the acquisition of these skills is assessed at the end of the courses and the entire study path. Individual learning assessment is based on written or oral tests.

Learning skills

Acquisition of adequate learning skills. These skills are acquired as part of the cultural background provided by the teachings. In particular:
- ability to continuously develop and deepen both theoretical and applicative skills, to keep up to date with developments in computer science, both methodological and related to digital technologies
- ability to use libraries, databases, archives and paper repertoires

Professional profile and employment opportunities

System, data and network security consultants

Role in a work context
The professional figures included in this category operate in the vast sector of business consultancy offered to companies to support them in the analysis and resolution of IT security issues relating to management of information systems, data processing, communications via networks, both intranet and Internet, and the development of interactive applications.
Skills associated with the role
They are professional figures with specific skills in the field of IT security technologies and methods and able to understand the business and organizational dynamics of the production environments in which they are called to operate. They are able to work by inserting themselves into structured projects and in heterogeneous business contexts, offering specialized knowledge that is usually not present in companies, operating both in the resolution of IT security issues pertaining to company information systems, and as support for technological innovation and the selection of IT security technologies.
Career opportunities
They carry out highly specialized professional activities in the field of business consultancy aimed at companies, public bodies and professional firms which often lack adequate IT security skills for the correct and effective management of information systems, including data processing in accordance with current regulations, the protection of company resources from violations and compromises of systems and the maintenance of the operation of systems, networks and applications in the event of computer intrusions or accidental malfunctions.

Technicians specialized in information technologies for the secure management of systems, networks and mobile devices

Role in a work context
IT security experts suitable for joining the corporate information systems staff to provide essential skills in the secure management of the data center, databases, architecture and network equipment, personal computers and company mobile devices.
The roles covered include: management of access procedures to systems and IT resources, secure configuration of equipment, configuration and management of specific technologies for IT security, monitoring the operation of company IT systems and management of technologies for disaster recovery and business continuity in the event of service interruption.
Skills associated with the role
These professional figures are specialists in both information technology and specific IT security technologies and methods. They are able to perform the typical functions of an IT expert, integrating them with knowledge of the main critical issues relating to IT security and technological solutions designed to guarantee an adequate level of protection of company resources and operations.
Career opportunities
The secure management of systems, networks and mobile devices is a corporate requirement that is widespread horizontally

across most industrial, public administration and service sectors. All large companies and most small and medium-sized companies have an internal staff for the management of their information systems, including proprietary data and management and commercial transactions. Security and operational guarantee requirements are present and relevant in all business and production environments equipped with an information system.

Technicians specialized in the analysis and development of software for business management with the application of IT security methodologies

Role in a work context
The professional figures included in this category belong to the professional profiles of Software Analysts and Designers, but have specific skills regarding secure development and programming, testing and analysis methodologies aimed at identifying security vulnerabilities, and correction and prevention systems for software security problems. They are also experts in cryptographic techniques (algorithms and protocols) to be used to protect data maintained in company databases.
Skills associated with the role
These professional figures integrate traditional software development and programming skills with specific knowledge of the main security issues that software may present. In the development cycle of software, these professional figures are therefore able to integrate the main methodologies for software security right from the design and planning phases, and then in the development and testing phases. Further skills are exercised in verifying the presence of software vulnerabilities in third-party products or management applications, defining, if necessary, the most suitable countermeasures
Career opportunities
Software development according to security criteria and verification of the security of third-party software are now common needs for most companies, public administrations and services. The professionalism of this profile is used in all corporate and production entities equipped with an information system or that develop software for third parties.

Technicians specialized in IT security methodologies adopted in the analysis and development of web/cloud applications/services and for mobile devices

Role in a work context
The professional figures included in this category belong to the professional profiles of Web application analysts and designers for whom it is now essential to have specific skills regarding the security of applications characterized by strong interactivity, by operating on an open network and, increasingly frequently, through the use of mobile devices.
These professional figures integrate the ability to develop web applications with knowledge of security issues, dealing with protecting corporate networks and individual users from what is now the main channel for the propagation of malicious code, unauthorized access to resources and cyber crimes.
Skills associated with the role
These professionals know the main methodologies used in the creation of web, interactive and mobile-based applications, dealing with both supporting their secure design and verifying their level of security through testing and monitoring tools and techniques. Skills in cryptographic techniques are used in the security of network communications and in the protection of data managed through web applications. They are also professionals who are very oriented towards technological innovation, considering the rapid evolutionary dynamics that characterize web technologies.
Career opportunities
The ever-increasing spread of web/cloud services, the evolution of e-commerce and the development of services for customers with mobile devices makes these professionals increasingly relevant in the context of production, sales and service provision. In addition, security in these contexts is becoming a decidedly priority considering the ever-increasing spread of scams or computer violations carried out via the web and on mobile devices and the consequences that such events can have on commercial reputation, in addition to direct economic damage.
These professional figures are therefore indispensable for all companies, both private and public and of all sizes and industrial sectors, that have adopted web services as one of the main communication channels for their commercial presence or for the provision of their services to third parties.

Technicians specialized in information and communication technologies
Role in a work context
The professional figures included in this category belong to the professional profiles of experts in the use of information and communication technologies in the various operational contexts, on which the L-31 course of study is based. These professional figures integrate the ability to develop IT applications with knowledge of operational problems in the various application contexts (industrial automation, information systems, digital communication, decision support, etc.) by designing, managing and maintaining even complex IT applications.
Skills associated with the role
These professional figures have a good basic knowledge and a broad spectrum of knowledge and skills in the various sectors of IT and telecommunications. They are familiar with the scientific method of investigation, have good modeling skills and know how to understand and use mathematical tools to support IT skills, are able to work in a group, operate autonomously, use the most appropriate technologies and fit quickly into work environments.
Career opportunities
Graduates can work in the most varied application areas for the design and management of IT and telematics systems and for the study of new systems and applications.

Initial knowledge required

Requirements and knowledge required for admission

To be admitted to the Degree Course, candidates must have a secondary school diploma or another qualification obtained abroad, recognized as suitable, as well as having adequate initial preparation. In particular, knowledge of basic scientific disciplines and understanding of elementary logic with a level of depth equal to that deriving from secondary school preparation are required.

Methods of verification of knowledge and personal preparation

The methods of access are established by the Admission Notice published on the page: https://informatica.cdl.unimi.it/it/iscriversi.
The course has a limited number of places in order to guarantee the quality of the educational offer in relation to the available resources and requires a TOLC (CISIA Online Test) as a test for admission. For enrollment in the first year, 150 places are available, of which 5 are reserved for non-EU students not residing in Italy. The TOLC can be taken at the University of Milan or any other university belonging to CISIA (Interuniversity Consortium for Integrated Access Systems). Registration for the TOLC must be done on the CISIA website (https://www.cisiaonline.it/).
The TOLC valid for registration is the TOLC-S, composed of the following sections: Basic mathematics (20 questions - 50 minutes), Reasoning, problems and text comprehension (15 questions - 30 minutes). Score: +1 for each correct answer, -0.25 for each incorrect answer, 0 for each unanswered question. The TOLC contains some additional sections (Biology, Chemistry, Physics, Geology, English). The results of these sections do not contribute to the test score.
After taking the TOLC-S, students must register for the selection for admission to the Degree Course, as indicated in the announcement. They will then be included in the merit ranking that will be formulated on the basis of the score obtained in the test, weighted, for each section, according to the criteria indicated in the announcement. The winners will be able to enroll within the established deadlines.
The selection is divided into distinct periods starting in February and ending in the first days of September.
Enrolled students who have not achieved a score greater than or equal to 10 in the Basic Mathematics module of the TOLC will be assigned Additional Training Obligations (OFA).

Additional training obligations and OFA recovery methods

For students with OFA, support activities will be organized in the period October-December, followed by a recovery test with which the student will have to demonstrate that he/she has improved his/her preparation. In the absence of this evidence, the student will not be able to take any second-year exams before passing the Mathematics I exam. Information: https://ssri.cdl.unimi.it/it/studiare/le-matricole

Transfers and second degrees

Students already enrolled in a degree course at the University of Milan, at another University or already graduated, can be exempted from the test only if they meet the following requirements to be verified during the pre-evaluation of their career:
- if the student, during the pre-evaluation phase, is recognized at least 30 credits, he/she is admitted to the second year or third year with exemption from the test;
- if the student is recognized less than 30 credits, he/she must register for the test and selection as indicated above.
To access the pre-evaluation, a specific request for preventive evaluation of the career must be submitted by accessing the online service indicated in the admission notice. Those interested must declare all the exams taken with the relative sectors, credits and grades and attach the course programs. For further details on the procedure, please refer to the announcement. The request for career evaluation must be submitted without fail by the date indicated in the announcement. The outcome of the evaluation will be communicated via email by the date indicated in the announcement.
Students admitted to years subsequent to the first must enroll by the deadlines and in the manner specified in the announcement.

Part-time enrollment

Part-time enrollment is also possible. The relevant Regulations can be found at the following link https://www.unimi.it/it/ateneo/normative/regolamenti/regolamento-le-iscrizioni-tempo-parziale

Compulsory attendance

Attendance is strongly recommended for both courses and laboratories.

Internship criteria

The internship is mandatory, is linked to the final paper and can be carried out on or off campus (at a company or another organization).
The internship experience normally consists of participating in a significant project, within which the student will independently carry out the activities assigned to him/her in accordance with the number of credits awarded for the internship under that programme (see "Manifesto degli studi").
The final paper must document the design and implementation aspects of the activity carried out, the professional or

scientific skills learned, as well as its connections with the state of the art in the IT sector.
The internship must last at least 14 weeks.
Upon completion of the internship, the student will earn 15 CFU, subject to the positive opinion of the Academic Board.
For the student to start the internship, he/she must comply with all the provisions of the relevant regulations.
Find out how to apply for an internship, read internship regulations and more at https://ssri.cdl.unimi.it/it/studiare/stage-e-tirocini

Degree programme final exams

The degree is obtained by passing a final exam, which consists of the presentation of a final report prepared by the student and related to the internship activity carried out. It must concern a theoretical or experimental activity carried out by the student, independently although under the guidance of one or more supervisors, at research laboratories, institutions or companies.

Campus

IT course venues: via Celoria 18 - Milan.
Other course venues: Teaching sector, via Celoria 20; Teaching sector, via Golgi 19; Teaching sector, via Venezian 15.

Laboratories

Computer laboratory (Silab) at the Department of Computer Science, via Celoria 18, Milan.

Notes

In order to obtain their degree, students must be proficient in English at a B1 level under the Common European Framework of Reference for Languages (CEFR). This proficiency level may be certified as follows:
- By submitting a language certificate attesting B1 or higher level in English and issued no more than three years before the date of submission. You will find the list of language certificates recognized by the University at: https://www.unimi.it/en/node/39322. The certificate must be uploaded during the enrolment procedure, or subsequently to the portal http://studente.unimi.it/uploadCertificazioniLingue;
- By taking a placement test offered by the University Language Centre (SLAM) between October and December of the first year. Students who fail the test will be required to take a SLAM course.
The placement test is mandatory for all those who do not hold a valid certificate.
Those who have not taken the placement test by the end of December or fail the end-of-course exam six times must obtain the necessary certification privately before graduating.

EXPERIENCE OF STUDY ABROAD AS PART OF THE TRAINING PROGRAM

The University of Milan supports international mobility by providing its students with the opportunity to spend study and internship periods abroad. It is a unique chance to enrich your educational path in a new exciting environment.

The agreements entered into by the University with over 300 universities from the 27 EU member countries under the European Erasmus+ programme allow regularly enrolled students to carry out part of their studies at one of the partner universities or to undertake internships at companies, training and research centres and other organisations.

Similar international mobility opportunities are provided outside Europe, through agreements with a number of prestigious institutions.

The University of Milan is a member of the 4EU+ European University Alliance that brings together eight public multidisciplinary universities: University of Milan, Charles University of Prague, Heidelberg University, Paris-Panthéon-Assas University, Sorbonne University of Paris, University of Copenhagen, University of Geneva, and University of Warsaw. The 4EU+ Alliance offers integrated educational pathways and programmes to promote the international mobility of students (physical, blended and virtual).

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, Czech Republic, Finland, France, Germany, Greece, Hungary, Lithuania, Norway, Netherlands, Poland, Portugal, Romania, Slovenia, Spain, Switzerland, Turkey. 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.
Erasmus: the coordinator for the Department of Informatics is Prof. Fabio Scotti.

International Programs: the coordinator for the Department of Informatics is Prof. Davide Rocchesso.
More information are available at the following link: https://di.unimi.it/it/rapporti-internazionali/mobilita-internazionale/opportunita-internazionali

How to participate in Erasmus mobility programs

How to participate in Erasmus+ mobility programmes

The students of the University of Milan can participate in mobility programmes, through a public selection procedure.
Ad hoc commissions will evaluate:
• Academic career
• the candidate's proposed study programme abroad
• his/her foreign language proficiency
• the reasons behind his/her application

Call for applications and informative meetings
The public selection for Erasmus+ mobility for study generally begins around February each year with the publication of a call for applications specifying destinations and requirements. Regarding the Erasmus+ Mobility for Traineeship, the University of Milan usually publishes two calls a year enabling students to choose a destination defined by an inter-institutional agreement or to find a traineeship position on their own.

The University organises informative meetings to illustrate mobility opportunities and rules for participation.

Erasmus+ scholarship
The European Union grants the winners of the Erasmus+ programme selection a scholarship to contribute to their mobility costs, which may be supplemented by the University funding for disadvantaged students.

Language courses
Students who pass the selections for mobility programmes can benefit from intensive foreign language courses offered each year by the University Language Centre (SLAM).
https://www.unimi.it/en/node/8/

Learn more at https://www.unimi.it/en/node/274/

For assistance, please contact:
International Mobility Office
Via Santa Sofia 9 (second floor)
Tel. 02 503 13501-12589-13495-13502
Contacts: InformaStudenti;
Student Desk booking through InformaStudenti

1st COURSE YEAR Core/compulsory courses/activities common

Learning activity	Ects	Sector
COMPUTER ARCHITECTURE	6	INFO-01/A
COMPUTER PROGRAMMING	12	INFO-01/A
CYBERCRIME LEGAL FRAMEWORK	6	GIUR-14/A
CYBERSECURITY MANAGEMENT	6	IEGE-01/A
English assessment B1 (3 ECTS)	3	NN
MATHEMATICS I	9	(6) MATH-05/A, (3) MATH-03/A
MATHEMATICS II	9	(6) MATH-05/A, (3) MATH-03/A
WEB AND MOBILE PROGRAMMING	6	INFO-01/A
Total compulsory credits	57	

2nd COURSE YEAR (available as of academic year 2027/28) Core/compulsory courses/activities common

Learning activity	Ects	Sector
ALGORITHMS AND DATA STRUCTURES	12	INFO-01/A
BIOMETRIC SYSTEMS	6	INFO-01/A
COMPUTER NETWORKS	12	INFO-01/A
DATABASES	12	INFO-01/A
OPERATING SYSTEMS I	6	INFO-01/A
OPERATING SYSTEMS II	6	IINF-05/A
STATISTICS AND DATA ANALYSIS	6	INFO-01/A
Total compulsory credits	60	

3rd COURSE YEAR (available as of academic year 2028/29) Core/compulsory courses/activities common			
Learning activity		**Ects**	**Sector**
COMPUTER FORENSICS		6	IINF-05/A
FUNDAMENTALS IN CRYPTOGRAPHY AND NETWORK SECURITY		6	INFO-01/A
OFFENSIVE SECURITY		6	INFO-01/A
SECURE SOFTWARE DESIGN		6	INFO-01/A
WEB AND MOBILE SYSTEMS SECURITY		6	INFO-01/A
	Total compulsory credits	30	
Elective courses			
End of course requirements			
ECONOMICAL, ETHICAL, SOCIAL, AND LEGAL ASPECTS OF IT		3	NN
FINAL EXAM		3	NN
TRAINING		15	NN
	Total compulsory credits	21	

COURSE PROGRESSION REQUIREMENTS

The course contains the following obligatory or advised prerequisites

Learning activity	**Prescribed foundation courses**	**O/S**
STATISTICS AND DATA ANALYSIS	MATHEMATICS I	Core/compulsory
ALGORITHMS AND DATA STRUCTURES	COMPUTER PROGRAMMING	Core/compulsory