

POLITECNICO DI MILANO



Academic Year 2012/13

V School of Engineering

Degree Programme of:

AUTOMATION ENGINEERING

Laurea

Milano Leonardo Campus

1. General Information

School	V School of Engineering
Code Reference Law	355
Name	AUTOMATION ENGINEERING
Reference Law	Ordinamento 270/04
Class of degree ⁽¹⁾	L-8 - Information Technology L-9 - Industrial Engineering
Degree level	Laurea
First year of activation	2008
Official length of the programme	3
Years of the programme already activated	1, 2, 3
Official language(s)	Italian
Campus	Milano Leonardo
Dean of the School	Roberto Negrini
President of the Study programme	Riccardo Scattolini
Website of the School	http://www.inginf.polimi.it
Website of the Study programme	http://ccs-automazione.elet.polimi.it/

(1) The student belongs to one or the other Degree class depending on the education chose.

Student Office (Study programme)

Reference office	Segreteria didattica del Dipartimento di Elettronica e Informazione
Address	Via Ponzio 34/5, 20133 Milano
Phone	02 2399 3400/3641

Central Student Office

Address	VIA C. GOLGI, 40 (MI)
Phone	800420470
e-mail address	https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=81

2. General presentation of the study programme

The role of Automation Engineers is to design, develop and manage automation systems for manufacturing plants, industrial processes, distribution networks and environmental systems. These activities require a strong background and multitalented skills in traditional engineering technologies (mechanical, electrical etc.) as well as in information technologies (control and automation, electronic, computer science, telecommunications). Increasingly complex automation systems are common in all industrial and tertiary fields and are used both to automate the processes and to improve the quality and technological content of products. The specialist in Automation Engineering has strong interdisciplinary competences which allow for a wide range of potential fields of employment and career in a technologically advanced and rapidly evolving society. For these reasons, the demand for graduates in automation and control engineering is steadily increasing.

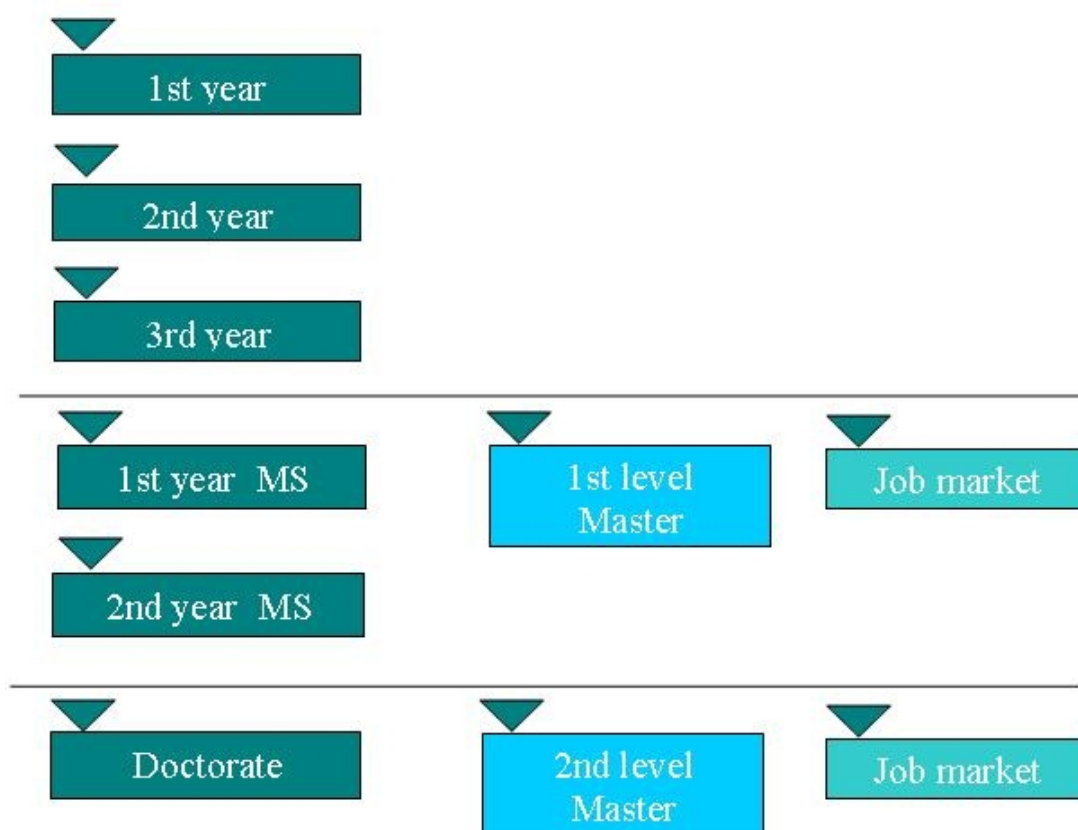
3. Learning objectives

The first cycle, resulting in a Bachelor of Science, forms experts with a well founded background in fundamental scientific disciplines, such as mathematics and physics, together with specific skills in the traditional engineering subjects, such as mechanics, thermodynamics, electrical machines and in the information technology subjects, i.e. computer science, electrical engineering, telecommunications and control. Thanks to the strong interdisciplinary nature of the curriculum, graduates have all the necessary skills to design or manage systems resulting from the integration of highly different technologies. This flexibility, both in the attitude and in the competences, is a significant asset of the Automation Engineer, in view of the wide range of possible applications, of the continuous and rapid evolution of technology and of the dynamics of the job market.

4. Organization of the study programme and further studies

4.1. Structure of the study programme and Qualifications

Automation Engineering is a three-year programme leading to a Bachelor of Science degree. Graduates can apply for a two-year Master of Science programme, possibly followed by three-year doctoral studies, as shown in the diagram below. Further information can be obtained from the web site of the School of Information Engineering <http://www.inginf.polimi.it>.



Flow diagram of the programme.

4.2. Further Studies

The qualification grants access to "Laurea Magistrale" (2nd degree), "Corso di Specializzazione di primo livello" (1st level Specialization Degree Course) and "Master Universitario di primo livello" (1st level University Master)

5. Professional opportunities and work market

5.1. Professional status of the degree

The graduate in Automation Engineering can take an examination to get an engineering license and join the Italian professional register of industrial or information engineers. There exist different registers for graduates holding a Bachelor of Science degree and graduates holding a Master of Science degree. However, in general it is not necessary to belong to the national register of engineers in order to practice, either in industry or in public administration.

5.2. Careers options and profiles

Automation Engineering offers challenging career opportunities in all the fields where automation and control are of paramount importance, such as:

- industry producing automatic machines, robots and more generally mechatronic systems, resulting from the integrated design of mechanics and control;

- process industry (chemical and petrochemical, pulp and paper, plastic, energy production and conversion, etc.);
- transportation systems (ground marine and aerospace) concerning both the development of vehicles (cars, boats, aircrafts, etc.) and the design, management and control of infrastructures (railway, motorway, underground, etc.);
- transportation and distribution networks (water, gas, electric power, etc);
- food industry;
- electrical appliances and domotics;
- environmental resources.

Typical companies where the automation engineers may operate include those producing and selling automation systems (both hardware and software); companies that use automated production plants or that manage highly complex services; engineering and consulting firms that design and project complex, economically challenging and technologically advanced plants and systems.

Surveys of evaluation nucleus

https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=204&idApp=1&idLink=1065

6. Enrolment

6.1. Access requirements

Secondary school leaving qualification, or foreign comparable qualifications

6.2. Requested knowledge

To be admitted onto the Bachelor of Science, a sufficient background is required in mathematics, physics, besides advanced verbal comprehension skills. A sufficient level of English is also required. Skills deemed essential are indicated each year in the public notices and in the Enrolment Guide by describing the subjects that will be part of the admission test. Should it emerge that students do not have these skills, they are assigned specific learning obligations before being able to attend the courses offered in the years following the first. The way in which these provisions are implemented is established every year by the Academic Senate.

The educational offer at the Politecnico di Milano

https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=204&idApp=1&idLink=2933

6.3. Deadlines

How to become a student at Politecnico di Milano

https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=204&idApp=1&idLink=3013

6.4. Tutoring and students support

The tutoring system is aimed at guiding and assisting students throughout their studies and encouraging them to actively participate in their education, removing obstacles preventing them from successfully attending courses, even through initiatives based on the needs and attitudes of the individuals.

The V School of Engineering offers a series of activities aimed at making university students more efficient and productive, with the assistance of both professor-tutors and student-tutors, the latter being selected by way of notice of competitions published by the University every year. The tutoring is for both first year students, for whom meetings with Mathematics, Physics and Information Technology professors are foreseen, and students from other years, for whom

activities exploring specific subjects that are defined every year are foreseen.
For further information on the activities carried out, please see the website
http://www.inginf.polimi.it/servizi/tutorato.php?id_nav=2950

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https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=204&idApp=1&idLink=2213

7. Contents of the study Program

7.1. Programme requirements

To graduate (Bachelor of Science) acquisition of 180 credits is required, as specified in the academic regulations. In particular, for the foundation subjects (mathematics, physics, computer science), at least 45 CFU credits are allocated, for the subject-specific courses (control and automation, convertors, electrical machinery and operations, mechanics) 55 CFU credits are required, for the integrative and similar activities (electronics, telecommunications, measurements, economic-management engineering) at least 20 CFU credits are allocated. It is possible to complete preparation by taking further academic activities or via a traineeship to be carried out at an external company (industry, engineering company). 3 CFU credits are foreseen for the final examination.

7.2. Mode of study

This Course requires a full time attendance and involves classroom and laboratory activities.

7.3. Detailed learning objectives

The Automation Engineering Bachelor of Science has just one track, the same for all students, that proposes different choices only in the second semester of the third year. An internship is recommended to students who intend to go straight into employment after graduating; while students who intend on continuing with their studies in the Master of Science programme are recommended to attend additional courses. For more information on how to start this internship and how it works, please see the relevant service put in place by the programme: (<http://ccs-automazione.elet.polimi.it/>).

Studies are organised on a semester basis: Approximately halfway into the semesters there is a week-long break in which students can take interim examinations. For information on how classes and exams are distributed in the year please see the academic calendar. More specific information on the organisation of each individual course is provided with the detailed programme of the course itself. The academic calendar and detailed programme of all courses are available on the V School of Engineering website (<http://www.inginf.polimi.it/>).

1 Year courses - Track: A1A - Non diversificato

Code	Att Form	SSD	Course Title	Type	Sem	Credits (CFU)	CFU Group
082740	A	MAT/05	ANALISI MATEMATICA 1	M	1	10.0	10.0
082746	A,B,C	ING-INF/05	FONDAMENTI DI INFORMATICA	M	1	10.0	10.0
082741	C	ING-IND/35	ECONOMIA E ORGANIZZAZIONE AZIENDALE	M	1	10.0	10.0
082745	A	FIS/01	FISICA	M	2	12.0	12.0
082747	A	MAT/03	GEOMETRIA E ALGEBRA LINEARE	M	2	8.0	8.0
082748	B	ING-IND/31	ELETTROTECNICA	M	2	10.0	10.0

2 Year courses - Track: A1A - Non diversificato

Code	Att Form	SSD	Course Title	Type	Sem	Credits (CFU)	CFU Group
085741	A	MAT/05	ANALISI MATEMATICA 2 (PER L'AUTOMAZIONE)	M	1	8.0	8.0
093279	C	ING-IND/09 ING-IND/10	FISICA TECNICA E MACCHINE	M	1	8.0	8.0
085743	A,B,C	ING-INF/05	SISTEMI INFORMATICI	M	1	8.0	8.0
085744	B,C	ING-INF/03	RETI DI TELECOMUNICAZIONE	M	1	5.0	5.0
085745	B	ING-INF/04	FONDAMENTI DI AUTOMATICA	M	2	10.0	10.0
085796	B	ING-IND/13	MODELLISTICA DEI SISTEMI MECCANICI	M	2	10.0	10.0
085746	B,C	ING-INF/01	FONDAMENTI DI ELETTRONICA	M	2	10.0	10.0

3 Year courses - Track: A1A - Non diversificato

Code	Att Form	SSD	Course Title	Type	Sem	Credits (CFU)	CFU Group
085742	B	ING-IND/32	MACCHINE ELETTRICHE E AZIONAMENTI	M	1	9.0	10.0
088689	--	--	PROVA FINALE (MACCHINE ELETTRICHE E AZIONAMENTI)	V	1	1.0	
088690	B	ING-INF/07	MISURE E STRUMENTAZIONE	M	1	8.0	8.0
088691	B	ING-INF/04	SISTEMI A EVENTI DISCRETI	M	1	5.0	5.0
088692	B	ING-INF/04	CONTROLLO DEI PROCESSI	M	2	7.0	8.0
088693	--	--	PROVA FINALE (CONTROLLO DEI PROCESSI)	V	2	1.0	
088694	C	ING-IND/17	IMPIANTI INDUSTRIALI E GESTIONE DELLA PRODUZIONE	M	2	9.0	10.0
088695	--	--	PROVA FINALE (IMPIANTI INDUSTRIALI E GESTIONE DELLA PRODUZIONE)	V	2	1.0	
085754	B	ING-INF/04	FONDAMENTI DI ROBOTICA	M	2	5.0	15.0
088696	--	--	TIROCINIO (INGEGNERIA DELL'AUTOMAZIONE)	T	1	15.0	
085887	A,B,C	ING-INF/05	BASI DI DATI 1	M	1	5.0	
088697	A	MAT/06	CALCOLO DELLE PROBABILITÀ E STATISTICA	M	1	10.0	
088696	--	--	TIROCINIO (INGEGNERIA DELL'AUTOMAZIONE)	T	2	15.0	
085900	A	CHIM/07	CHIMICA GENERALE	M	2	5.0	
086000	A	MAT/05	ELEMENTI DI ANALISI FUNZIONALE E TRASFORMATE	M	2	5.0	
088698	C	MAT/09	FONDAMENTI DI RICERCA OPERATIVA	M	2	5.0	

Education activities to be chosen by students: in the third year all students can propose independently chosen activities for 15 CFU. The automation engineering study Programme board must check that the proposal is compatible with the educational project. Compatibility is assured to the courses reported in the previous table. In particular, the courses of "Probability and statistics" and of "Fundamentals of operations research" are suggested to students who intend on continuing with their studies in the Master of Science programme.

7.4. Foreign language

Students must have a certificate attesting their English language skills to at least level B1 of the CEF – Common European Framework.

Language courses

https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=204&idApp=1&idLink=3093

7.5. Degree examination

The final examination consists in an exam of the subjects *Electrical Machines and Drives*, *Process Control*, *Industrial Systems and Production Management*, each of which will dedicated one of the credits assigned to it to its preparation.

Information concerning general rules and regulations, session calendars, registration and consignment of theses is available at

https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=204&idApp=1&idLink=3173

8. Academic calendar

Academic calendar

https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=204&idApp=1&idLink=3253

9. Faculty

The list of the academic staff will be made available by the University offices at the beginning of each academic year.

The names of professors for each Course, together with their subject, will be available on the degree programme starting from the month of September. The degree programme is annually published on the website of Politecnico di Milano.

10. Infrastructures and laboratories

Automation Engineering students will have access to all of the Politecnico di Milano facilities (computer-equipped rooms, libraries, studios, canteens, sports facilities). Various courses foresee laboratory activities that will be carried out in computer-equipped rooms or experimental laboratories.

Further information concerning this topic is available on the degree programme. The degree programme is annually published on the website of Politecnico di Milano.

11. International context

Research at the Politecnico di Milano proceeds alongside the extensive network of cooperative relationships and connections with other Italian and foreign universities, with public and private research centres and with the industrial system. The quality and effect of research carried out at the Politecnico have been confirmed in recent years by the increase in connections with the international scientific community. Testimony to this is the large number of research projects and programmes that have recently been undertaken with the best European and worldwide universities, from North America to South-East Asia.

In 2007, the university departments submitted their research activities to an international assessment process (peer review). In order to ensure impartiality of the assessment, the coordinators of the assessment panels have been chosen by the Chancellors from European technical universities (for the most part chosen amongst those that are higher than the Politecnico in international rankings), and in turn, the coordinators chosen have decided the composition of their groups. In total, the process has seen participation by 81 experts (not one Italian) from 52 universities and international research centres.

The university obtained a total score of 3 (good at International level) on a scale of 1 to 4 (excellent). Out of the 1270 professors involved in the peer review process, 39% were valued

“excellent at International level” and 21% were valued “good at International level”.

Various research groups concerning the Automation Engineering Bachelor of Science were rated "excellent at international level" amongst which:

Control systems science and engineering

Electronic devices

Information systems

Information transmission and radio communications

Networking

Operations research and discrete optimization

Analysis design and management of manufacturing systems

Ground vehicles design and testing

Mechatronics and robotics

Road vehicle dynamics

Virtual prototyping

Politecnico di Milano is presently performing benchmarking analyses with most prominent international technical universities. on the overall results analysing the teaching activities and the integration of graduates into the job market. Reports and studies on this topic will be available at the Politecnico di Milano website, in the section “Manifesto degli Studi”

12. Internationalization

Students on the Automation Engineering programme can access international study programmes, based on the agreements held with numerous foreign institutions. Every year various students, both Italian and foreign, take part in international exchanges. Students chosen for a specific programme can enrich their profiles by studying abroad and earning credits that are fully acknowledged by the Politecnico di Milano.

There are multiple opportunities on offer. Amongst them are the following:

- study periods abroad with the Erasmus programme, or other non-EU special programmes;
- double degree programmes (foreseeing awarding of a double master of science over a 3 year period, of which two are spent in a partner institution abroad);
- traineeship in companies or foreign university laboratories;
- writing the final thesis abroad.

The degree programme is annually published on the website of Politecnico di Milano.

Information on exchange programmes, double degree projects and international internships, European research and international relations projects are available at

https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=204&idApp=1&idLink=3333

13. Quantitative data

Evaluation Unit regularly reports on programs final results, including input indicators, performances and quality didactic features, graduates' employability. Reports are available on:

https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=204&idApp=1&idLink=3653

More detailed data are available on the web site:

https://aunicalogin.polimi.it/aunicalogin/getservizio.xml?id_servizio=204&idApp=1&idLink=3573

14. Further information

Further information on the Automation Engineering programme at the Politecnico di Milano can be found on the website:

<http://ccs-automazione.elet.polimi.it>

indicating all the e-mail addresses to which it is possible to write and ask questions related to specific topics.

15. Errata corrige

No contents for this section.

BONZA