

INTRODUCTION

The purpose of the Diploma Supplement is to provide sufficient independent data to improve the international '*transparency*' and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It is free from any value judgements, equivalence statements or suggestions about recognition. This Diploma Supplement model was developed by the European Commission, Council of Europe and UNESCO.

1 INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1 Last name(s)

RANERI

1.2 First name(s)

ALESSANDRO

1.3 Date of birth (dd/mm/yyyy)

17/11/2001

1.4 Student identification number or code (if available)

220925

2 INFORMATION IDENTIFYING THE QUALIFICATION

2.1 Name of the qualification and title conferred (in the original language)

Laurea magistrale in ENERGY ENGINEERING
Dottore magistrale

2.2 Main field(s) of study for the qualification

Energy and nuclear engineering (LM-30)
ISCED code: 0713

2.3 Name (in original language) and status of the awarding institution

Politecnico di Milano (Istituzione statale), Piazza Leonardo da Vinci 32, 20133 Milano

2.4 Name and status of institution (if different from 2.3) administering studies (in original language)

Same as in 2.3

2.5 Language(s) of instruction/examination

English

3
INFORMATION ON THE LEVEL AND DURATION OF THE QUALIFICATION
3.1
Level of qualification

Second Cycle QF-EHEA - Level 7 EQF

3.2
Official duration of the programme in credits and/or years

120 CFU/ECTS - 2 full time years

3.3
Access requirement(s)

First cycle degree (level 6 EQF) or comparable qualification

The admission to Laurea Magistrale (equivalent to Master of Science) is subject to an assessment process that aims to verify the candidate's adequacy. This process, according to the Law (D.M. 22/10/2004 n. 270 art. 6 comma 2 and D.M. del 16/3/2007, art.6 comma 1), is based on curricular requirements and on assessing the student's suitable preparation

4
INFORMATION ON THE CONTENTS AND RESULTS GAINED
4.1
Mode of study

Attendance is not compulsory but is highly recommended: it is in fact very important in facilitating learning and in acquiring the essential critical abilities. Programme courses are delivered with conventional methods (lectures, exercises, IT, experimental and design laboratories), but with teaching methods appropriate for achieving the educational objectives defined by the Dublin descriptors (see paragraph 2).

4.2
Programme learning outcomes

Graduates will:

- possess in-depth knowledge of the theoretical and scientific aspects of mathematics and other base sciences and be able to use this knowledge to interpret and describe complex engineering problems or problems that require an interdisciplinary approach;
- possess in-depth knowledge of the theoretical and scientific where complex problems that require an interdisciplinary approach can be identified, formulated and solved through an innovative approach;
- be able to ideate, plan, design and manage complex and/or innovative systems, processes and services;
- be able to design and manage highly complex experiments;
- possess context knowledge as well as the ability to think flexibly;
- possess knowledge of company and professional culture;
- be able to speak and write fluently in at least one European Union language, other than Italian, for professional purposes.

4.3 Programme details, individual credits gained and grades/marks obtained

Code	Educational activities	SSD Code		CFU/ECTS credits	Recognit ion	Grade	Date
054065	ENERGY CONVERSION A	ING-IND/09	10.00	10.00		21	07/02/2023
055635	ENERGY AND CLIMATE CHANGE MODELING AND SCENARIOS	ING-IND/35	8.00	8.00		25	07/06/2023
052395	GREEN BUILDING ENERGY SYSTEMS	ING-IND/11	8.00	8.00		18	20/06/2023
056956	THERMOECONOMICS AND ENERGY MODELING	ING-IND/10	8.00	8.00		18	05/09/2023
055915	WIND, HYDRO AND GEOTHERMAL POWER GENERATION	ING-IND/09	8.00	8.00		25	08/01/2024
055639	SOLAR AND BIOMASS POWER GENERATION	ING-IND/09	8.00	8.00		25	19/01/2024
057902	ZERO EMISSION AND POSITIVE ENERGY DISTRICTS	ING-IND/11	8.00	8.00		22	26/01/2024
052389	ELECTRIC CONVERSION FROM GREEN SOURCES OF ENERGY	ING-IND/31	4.00	8.00		18	15/02/2024
		ING-IND/32	4.00				
097386	DEVELOPMENT ECONOMICS	ING-IND/35	4.00	8.00		24	10/06/2024
		SECS-P/01	4.00				
095910	FUNDAMENTALS OF CHEMICAL PROCESSES	ING-IND/27	8.00	8.00		29	25/06/2024
055640	MATERIALS FOR DIRECT ENERGY CONVERSION	ING-IND/23	8.00	8.00		24	24/07/2024
095902	HEAT AND MASS TRANSFER	ING-IND/10	10.00	10.00		20	10/01/2025
097440	GRADUATION THESIS AND FINAL EXAM (ENG)			20.00		--	30/06/2025
Total CFU/ECTS credits				120			

Key

Thesis/Final Exam

Title	Supervisor	Reference discipline
Simulation of Heat Transfer in Reciprocating Compressors	GIUFFRIDA ANTONIO	IIND-06/B - ENERGY SYSTEMS AND POWER GENERATION

4.4 Grading system and, if available, grade distribution table

Individual subjects are graded on a scale from 18 to 30, with 18 and 30 as minimum and maximum grade respectively. A "cum laude" can be added to the maximum grade as a special distinction.

GRADE DISTRIBUTION TABLE

ISCED code: 0713			Energy and nuclear engineering (LM-30)										Second Cycle QF-EHEA - Level 7 EQF	
GRADE	18	19	20	21	22	23	24	25	26	27	28	29	30	30 cum laude
N marks	582	388	590	659	755	883	1219	1329	1505	1850	1874	1144	1547	606
%	3,90	2,60	3,95	4,41	5,06	5,91	8,16	8,90	10,08	12,39	12,56	7,66	10,36	4,06
Cumulative %	100,00	96,00	93,00	89,00	85,00	80,00	74,00	66,00	57,00	47,00	34,00	22,00	14,00	4,00
Years considered: from 01/11/2021 to 31/10/2024										Total number of final marks considered: 14931				

4.5 Overall classification of the qualification (in original language)

Final mark: 86/110

Date 22/07/2025

For I and II cycle programmes the final grade is based on a maximum of 110points, with 66/110 as the lowest passing grade. In case of excellence, 110 cum laude may be awarded. The final grade is based on the curriculum as well as on the final exam.

GRADE DISTRIBUTION TABLE

Energy and nuclear engineering (LM-30)			
ISCED code: 0713		Second Cycle QF-EHEA - Level 7 EQF	
GRADE	N marks	%	Cumulative %
74	1	0.09	100,00
76	1	0.09	99,00
77	3	0.27	99,00
79	4	0.36	99,00
80	4	0.36	99,00
81	7	0.62	98,00
82	11	0.98	98,00
83	11	0.98	97,00
84	5	0.44	96,00
85	18	1.60	95,00
86	11	0.98	94,00
87	19	1.69	93,00
88	21	1.87	91,00
89	17	1.51	89,00
90	31	2.75	88,00
91	39	3.46	85,00
92	27	2.40	81,00
93	45	4.00	79,00
94	38	3.37	75,00
95	37	3.29	72,00
96	46	4.09	68,00
97	39	3.46	64,00
98	42	3.73	61,00
99	25	2.22	57,00
100	63	5.60	55,00
101	46	4.09	49,00
102	48	4.26	45,00
103	45	4.00	41,00
104	50	4.44	37,00
105	64	5.68	33,00
106	37	3.29	27,00
107	42	3.73	24,00
108	32	2.84	20,00
109	26	2.31	17,00
110	85	7.55	15,00
110 cum laude	86	7.60	7,00

Person code: 10892919

Document ID: 280187/1

Date of issue: 01/08/2025

Register number: 0725-0102

Years considered: from 01/11/2021 to 31/10/2024

Total number of final marks considered: 1126

5
INFORMATION ON THE FUNCTION OF THE QUALIFICATION
5.1
Access to further study

The qualification grants access to "Dottorato di Ricerca" (Research Doctorate), "Corso di Specializzazione di secondo livello" (2nd level Specialization Course) and "Master Universitario di secondo livello" (2nd level University Master)

5.2
Access to a regulated profession (if applicable)

Gives access to the state exam required to practice as: INGEGNERE INDUSTRIALE, INGEGNERE INDUSTRIALE IUNIOR

6
ADDITIONAL INFORMATION
6.1
Additional information
6.2
Further information sources

<http://www.polimi.it/>; <http://www.miur.it/>;

7**CERTIFICATION OF THE SUPPLEMENT****7.1****Date (*)****7.2****Signature (*)**

Dott.ssa Assunta Marrese

7.3**Capacity**

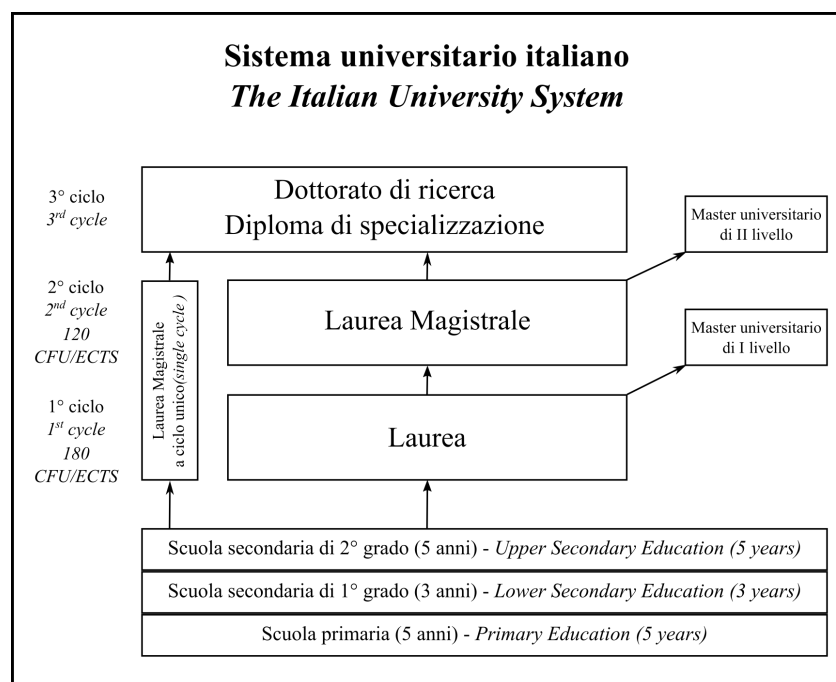
La Dirigente dell'Area Didattica

7.4**Official stamp or seal (*)**

(*) Date, signature and stamp are available only if requested by the holder of the Diploma Supplement

8
INFORMATION ON THE NATIONAL HIGHER EDUCATION SYSTEM

The Italian university system is organised in three cycles, according to the Bologna structure: the main academic degrees are the Laurea (1st cycle), the Laurea Magistrale (2nd cycle) and the Dottorato di Ricerca (3rd cycle). The system also offers other study programmes and related qualifications.


First cycle

This cycle consists exclusively of Corsi di Laurea. These degree programmes provide students with an adequate command of general scientific methods and contents as well as with specific professional skills. The general access requirement is the Italian school leaving qualification awarded after completion of 13 years of schooling and passing the relevant State examination; comparable foreign qualifications may also be accepted. Admission to some degree courses may be based on specific course requirements. The studies last 3 years. The Laurea is awarded to students who have gained 180 ECTS credits (called Crediti Formativi Universitari - CFU) and satisfied all curricular requirements, including the production of a final written paper or equivalent final project. The Laurea gives access to the Corsi di Laurea Magistrale as well as to other 2nd cycle study programmes.

Second cycle

The main degree programmes in this cycle are the Corsi di Laurea Magistrale. They provide education at an advanced level for the exercise of highly qualified activities in specific areas. Access is by a Laurea degree or a comparable foreign degree; admission is based on specific course requirements determined by single universities. The studies last 2 years. The Laurea Magistrale degree is awarded to students who have gained 120 ECTS/CFU credits and satisfied all curricular requirements, including the production and public defence of an original dissertation.

Some programmes (namely, those in dentistry, medicine, veterinary medicine, pharmacy, architecture, construction engineering/architecture, law, primary education) are defined "single cycle programmes" (Corsi a ciclo unico); for these programmes access is by the Italian school leaving qualification (or a comparable foreign qualification); admission is based on entrance exams. The studies last 5 years (6 years and 360 ECTS/CFU credits in the cases of medicine

and dentistry). A Laurea Magistrale degree is awarded to students who have gained 300 ECTS/CFU credits and satisfied all curricular requirements, including the production and public defence of an original dissertation.

A Laurea Magistrale degree gives access to Corsi di Dottorato di Ricerca as well as to other 3rd cycle study programmes.

Third cycle

The main degree programmes in this cycle are Corsi di Dottorato di Ricerca (research doctorate programmes); the students/young researchers enrolled in these programmes will acquire methodologies for advanced scientific research, will be trained in new technologies and will work in research laboratories, wherever appropriate. Access is by a Laurea Magistrale degree (or a comparable foreign degree); admission is based on a competitive exam; studies last at least three years and include the completion and public defence of an original research project.

Other programmes

- **Corsi di Specializzazione:** these are 3rd cycle programmes intended to provide students with the knowledge and skills required for the practice of highly qualified professions, mainly in medical, clinical and surgical specialities. Admission is by a Laurea Magistrale degree (or by a comparable foreign degree) and is based on a competitive exam; studies may last from 2 (120 ECTS/CFU credits) to 6 years (360 ECTS/CFU credits) depending on the discipline. The final degree awarded is a Diploma di Specializzazione.
- **Corsi di Master Universitario di primo livello:** these are 2nd cycle programmes intended to provide students with further specialization or higher continuing education after completion of the first cycle. Access is by a Laurea degree (or a comparable foreign degree); admission may be subject to additional requirements. Studies last at least 1 year (60 ECTS/CFU credits). The qualification awarded (Master Universitario di primo livello) does not give access to Corsi di Dottorato di Ricerca or to any other 3rd cycle programme, since this type of course does not belong to the general requirements established at national level, but it is offered under the autonomous responsibility of each university.
- **Corsi di Master Universitario di secondo livello:** these are 3rd cycle programmes intended to provide students with further specialization or higher continuing education studies after completion of the second cycle. Access is by a Laurea Magistrale degree (or a comparable foreign degree); admission may be subject to additional requirements. Studies last at least 1 year (60 ECTS/CFU credits). The qualification awarded (Master Universitario di secondo livello) does not give access to Corsi di Dottorato di Ricerca or to any other 3rd cycle programmes, since this type of course does not belong to the general requirements established at national level, but it is offered under the autonomous responsibility of each university.

CREDITS

Degree courses are structured in credits (Crediti Formativi Universitari - CFU). University credits are based on the workload students need in order to achieve the expected learning outcomes. Each credit corresponds to 25 hours of student workload, including independent study. The average workload of a full time student is conventionally fixed at 60 credits per year. Thus, the CFU fully coincide with ECTS credits

Classes of Degree Courses

All degree programmes of Laurea and Laurea Magistrale sharing general educational objectives are grouped into "classes". In developing the specific learning outcomes of single programmes, Universities have to comply with some national requirements for each class concerning the types (and corresponding amount of credits) of teaching-learning activities to be included. Degrees belonging to the same class have the same legal value.

Academic Titles

Those who receive the Laurea are entitled to be called "Dottore", the holders of a Laurea Magistrale have a right to the title of "Dottore Magistrale", the Dottorato di ricerca confers the title of "Dottore di Ricerca" or "PhD".

Joint Degrees

Italian universities are allowed to establish degree programmes in cooperation with Italian and foreign partner universities, on completion of which joint or double/multiple degrees can be awarded.

Further information

Italian Qualifications Framework (Quadro dei Titoli Italiani - QTI) <http://www.quadrodeititoli.it>