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PhD School - Politecnico di Milano

Regulations of the PhD Programme in:

Industrial Chemistry and Chemical Engineering

Cycle XXXVIII

1. General Information

PhD School - Politecnico di Milano

PhD Programme: Industrial Chemistry and Chemical Engineering

Course start: November 2022

Location of the PhD Programme: Milano Leonardo

Promoter Department: Chemistry, Material and Chemical Engineering “G. Natta”

Scientific Disciplinary Sectors

- ING-IND/23 Applied physical chemistry
- ING-IND/24 Fundamentals of chemical engineering
- ING-IND/25 Chemical plants
- ING-IND/26 Analysis, design and control of chemical processes.
- ING-IND/27 Chemical technologies
- CHIM/07 Chemical foundations of technologies

PhD School Website: https://www.dottorato.polimi.it/
PhD Programme Website: https://www.dottorato.polimi.it/en/phd-programmes/engineering/industrial-chemistry-and-chemical-engineering

Areas:
Area 03 - Chemistry
Area 09 - Industrial and information engineering

2. General presentation

The aim of the PhD is to develop a research-driven mentality through the acquisition of experience and skills in a specific research topic. This goal is pursued through the development of an original research contribution, presented through the PhD thesis. The whole activity is conducted according to the guidelines of a supervisor.
The general topic of the PhD in Industrial Chemistry and Chemical Engineering is the application of chemical, chemical-physical and engineering culture to all the activities related to the identification, synthesis, design, production and transformation of matter and energy. Basic disciplines are the necessary and fundamental tools. The goal of the PhD program is to provide students with tools for understanding, planning and managing processes and systems, but especially to develop new applications, design and feature new products and services. A variety of research topics are offered, including many areas of industrial chemistry and technology, such as: Catalysis and bio-catalysis;

Biotechnology; Process development; Process safety; Food safety; Advanced materials; Human health; Innovative and efficient energy technologies; Low-impact combustion processes; Design and conduct of systems optimizing the choice of raw materials, costs and sustainability thanks to methods derived from big data analysis. Therefore, this study program involves not only the processes of synthesis and transformation of matter (in its broadest sense, from pharmaceuticals to materials), but also the places where these processes take place, which may be industrial plants in the proper sense (from laboratory experimentation up to industrial production including environmental concerns and safety), and natural environments (from the atmosphere to a reservoir where for instance chemical transformations of discharged pollutants take place, and the pharmacokinetics applied to the human body allows modelling and controlling the effect of a drug). In this context, the issues related to the lifecycle of the product (such as those related to quality of the product or interaction with the absorption-organ function-excretion of a drug) are also considered.

The PhD course is run by a Coordinator and a Faculty Board.
The Coordinator chairs the Faculty Board, coordinates the preparation of the annual Educational Programme and organises the general educational activities of the PhD course (see Attachment A1).
The Faculty Board is responsible for the Educational programme and for teaching and administrative activities related to the PhD course (see Attachment A2).

3. Objectives

The study of basic disciplines is seen as a necessary tool for the rationalization of technologies and of their rational, safe and sustainable use.
The training objective is not only trivially to provide the students with tools for the understanding, planning and management of processes and systems, but also to enable them to independently develop new technological applications and to design and characterize new products and new services with such characteristics.

The qualification of a PhD student is accomplished through the development of an original research work on a specific topic typical of the Industrial Chemistry and Chemical Engineering PhD.

A list of possible and specific topics includes:

- chemistry of natural compounds;
- catalysis and bio-catalysis;
- biotechnology;
- development of innovative chemical processes;
- food safety and quality assurance;
- advanced materials;
- human health;
- innovative energy technologies, with particular attention to energy consumption;
- development of combustion processes with low environmental impact, including the internal combustion engines;
- methodologies and criteria for process and plant design and operation, considering the choice

of raw materials, the cost of the process, safety issues and sustainability
- design and control of operation units and of the whole plant through mathematical modelling and computer simulation techniques;
- study of processes at the microscopic scale, deepening the thermodynamics and kinetics;
- study of electrochemical processes with an interdisciplinary and multidisciplinary approach that involves the chemical and metallurgic engineering, material engineering and energetics;
- synthesis, characterization, process technology, and use of substances;
- design based on the structures of compounds of chemical and biological interest (synthesis, processing, use);

4. Professional opportunities and job market

Graduated PhDs in Industrial Chemistry and Chemical Engineering have a wide range of professional opportunities, including research positions in Universities and research institutions, as well as in chemical and in engineering companies and in numerous other industrial sectors. Different and specific activities, inside different sectors, can be found in the general context characterizing the Doctoral Program in Industrial Chemistry and Chemical Engineering. Accordingly, the Research Doctors will be able to find a natural location in process companies, and in private as well as public companies and institutes, operating in the field of research, design, production, formation, control and consultancy services.

5. Enrolment

5.1 Admission requirements

Italian and International citizens can apply. They are requested to have graduated in accordance with the pre-existing laws D.M. 3.11.1999 n. 509, or to have a Master of Science degree in accordance with D.M. 3.11.1999 n. 509, or a Master of Science in accordance with D.M. 22.10.2004 n. 270, or similar academic title obtained abroad, equivalent for duration and content to the Italian title, with an overall duration of university studies of at least five years.
The certified knowledge of the English language is a requirement for admission. Please refer to the PhD School website for details.
The admission to the programmes will be established according to the evaluation of the candidates' curricula, motivation letters, and an illustrative report about the development of a possible PhD research, which candidates will send contextually with their application to the admission announcement.

5.2 Admission deadlines and number of vacancies

The number of positions is indicated in the Call for admission to the 38th PhD cycle Programmes: https://www.dottorato.polimi.it
Scholarships both on general and on specific themes are available, in accordance with what is specified in the call for admission.

6. Contents

6.1 Requirements for the PhD title achievement

The achievement of the PhD title in Industrial Chemistry and Chemical Engineering requires a study and research activity of at least three years equivalent of full time study, research and development of PhD thesis.
PhD candidates in Industrial Chemistry and Chemical Engineering must earn a minimum of 25 course credits (see paragraph 6.3 below), and to continuously conduct studies and research.
At the beginning of the course, the Faculty Board assigns a tutor to each PhD candidate to supervise and assist him/her in the overall training programme. The tutor shall be a professor belonging to the Faculty Board. The tutors assist the candidates in the choice of courses to be included in the study plan, which is eventually submitted for approval to the Coordinator of the PhD Programme (see also section 6.4 below).
The Faculty Board may assign extra course credits to one or more candidates, in case they need to complete their preparation in specific topics, relevant for their research projects.

6.2 Research development

The main aim of all Politecnico di Milano PhD programmes is the development in the candidates of a research-oriented mind-set, with expertise and skills in a specific research topic. To this end, candidates develop a problem-solving capability in complex contexts, including the capacity of performing deep problem analysis, identifying original solutions, and evaluating their applicability in practical contexts.
These skills provide the PhD candidates with major opportunities of development in their research both in the academic field, and in public and private organisations.
PhD candidates are requested to develop an original research contribution. The PhD thesis must thus contribute to increase the knowledge in the candidate's research field. Besides, it has to be coherent with the research topics developed in the Department where the PhD Programme is carried out.
The original research results are collected in the PhD thesis, where the candidate's contribution is put in perspective with respect to the research state of the art in the specific research field.
The PhD research is developed under the guidance of a supervisor, who supports the candidate in the setting-out and in the everyday activities related to the thesis development. The supervisor is not necessarily a member of the Faculty Board, and may also belong to an institution different from Politecnico di Milano. The supervisor can be supported by one or more co-supervisors.
Further activities intended to develop the candidate's personal skills and research expertise are encouraged during the PhD path.
Candidates must acquire the capability to present and discuss their work in their research community. Consequently, both the participation to international conferences and the publication of the research results in peer-reviewed journals are encouraged.
The PhD programme favors the candidates' research interactions with other groups in their research field, preferably abroad. Research visits of at least three months are strongly encouraged, as through them the candidates may acquire further skills to develop their research work and thesis.
The duration of the programme is normally three years.

6.3 Objectives and general framework of the teaching activities

The PhD Programmes and the PhD School activate teaching forms of different kind and credit value, including courses, seminars, project workshops, laboratories. Teaching activities both cover the basic research issues (problems, theories, methods), which represent the founding element of the PhD Programme and identify clearly its cultural position, and deepening in a specialist way some research issues connected with the problems developed in the theses.
Lessons are usually held in English, except when indicated otherwise. The PhD programme includes at least one complete path delivered in English language.
Structured teaching activities allow to earn ECTS credits. Other activities, typically specialized and for which it is difficult to evaluate the learning and its quantification, fall within the scientific activities and are taken into account by the Faculty Board in the overall evaluation, but they do not allow to earn ECTS.

The PhD School of Politecnico di Milano proposes a set of courses aiming to train the PhD candidates in soft and transferable skills. The skills and abilities provided by these courses are expected to help candidates across different areas of their careers in order to respond to the rapidly evolving needs of the global economy and society at large. The PhD School courses activated for the 2022-2023 Academic Year are summarized in the following table.

Professor	**Course title**
Armondi Simonetta	Strengthening Critical Spatial Thinking
Balducci Alessandro	Approaches to Resilience: Social, Economic, Environmental and Technological Challenges of Contemporary Human Settlements
Biscari Paolo	English for Academic Communication
Biscari Paolo	Industrial skills
Biscari Paolo	Scientific communication in English
Brunetto Domenico	Innovative teaching skills
Canina Maria Rita	Creative design thinking
Cardilli Lorenzo	European Culture
Di Blas Nicoletta	Professional Communication
Fuggetta Alfonso	Project Management Basics
Iarossi Maria Pompeiana	Power of Images and Visual Communication for Research Dissemination
Mancini Mauro	Project Management (in Action)
Masarati Pierangelo	Ethical Aspects of Research on Dual-Use Technologies
Mauri Michele	Research Communication. Issue mapping: exploring public debates surrounding academic topics
Oppio Alessandra	How to support Complex decisions: Approaches and Tools
Ossi Paolo Maria	Sulla responsabilità della Tecnica
Oxoli Daniele	The Copernicus Green Revolution for Sustainable Development
Paganoni Anna Maria	La comunicazione nella Scienza
Pizzocaro Silvia Luisa	Practicing Research Collaboration / La pratica della collaborazione nella ricerca
Raos Guido	Science, Technology, Society and Wikipedia

Sancassani Susanna	Teaching Methodologies, Strategies and Styles
Sciuto Donatella	Research skills
Tanelli Mara	Cognitive biases and discriminations: implications, risks and opportunities
Volonte' Paolo Gaetano	Introduction to Academic Research

At least 10 of the 25 course credits that each candidate is required to earn shall be obtained through soft and transferable skills courses organized by the PhD School.

Each PhD student is asked to attend the following courses: i) at least 1 course of 5 credits chosen among those offered by the *Industrial Chemistry and Chemical Engineering* (CIIC) doctoral program; The seminar course entitled 'Chemical Engineering Frontiers', which is made up of a series seminars kept by high profile scientists or researchers, is mandatory. The seminars will be given in the course of the whole three years of the PhD program. ii) at least 2 courses of 5 credits chosen among those offered by the Politecnico PhD school; iii) the remaining courses can be chosen among those offered by the CIIC doctoral program, the PhD school or the MS programs offered by Politecnico di Milano. One international school can also be attended: its length should be three days (minimum) and a certificate of attendance should be provided. The detailed list of courses can be found on the website http://www.dottorato.polimi.it/en/phd-programmes/active-phd-programmes/industrial-chemistry-and-chemical-engineering/.

The tables below summarize the candidate's path (as regards coursework activities). At the same time, the programme foresees that the candidates are devoted to research activity in a continuous way, following the lead of their supervisors, and of the Faculty Board.

First/Second Year

Courses	**Possible details or reference to following tables**	**Number of credits (25)**	**Note**
PhD School Courses	See Table B	10÷20	
Courses characterising the PhD Programme	See Table A	5÷15	
Other PhD courses / MS program		0÷5	See courses offered by the other PhD programs at Politecnico: http://www.dottorato.polimi.it/en/phd-programmes/
International School		0÷5	Certificate of attendance needed. Minimum duration 3 days.

Third year

In the third year the candidate should be devoted entirely to the research and to the development of the PhD thesis.

PhD Course List

A) The PhD Programme in Industrial Chemistry and Chemical Engineering organises the **Characterising Courses** listed in table A.
For the admission to the final exam the acquisition of at least 5 credits in this list is **mandatory**.

B) The PhD School organises every year general and Interdoctoral courses. The acquisition of **at least 10 credits** is **mandatory** among the courses of B type. The list of PhD courses organized by the PhD School is available at the website https://www.dottorato.polimi.it/en/current-phd-candidates/during-the-phd/study-plan

C) Other PhD courses
A maximum of 10 mandatory credits can be obtained by choosing among courses provided by other PhD programmes at Politecnico di Milano. Additionally, these 10 credits can also be obtained attending an international school (5 credits) and/or courses offered by Politecnico di Milano, chosen among those offered inside Master of Science programs.

PREPARATORY COURSES (only if foreseen)

If the supervisor and the tutor find it useful or necessary that the candidate attends preparatory courses (chosen among the activated courses at the Politecnico di Milano) the Faculty Board of the PhD programme may assign some extra-credits to be acquired to complete the training path. The credits acquired in this way will be considered as additional, in relation to the mandatory credits to be acquired with the PhD courses.

SPECIALISTIC COURSES, LONG-TRAINING SEMINARS
The attendance of Specialist Courses, Workshops, Schools, Seminars cycles is strongly encouraged. The attendance to schools (certificate of attendance needed, minimum duration 3 days) may permit to acquire 5 credits according the modalities established by the Faculty Board concerning the evaluation. Courses and workshops can be inserted in the study plan, even if they are not evaluated (and therefore not qualified as credits), as optional “additional teaching”.

The scheduled course planning for the academic year 2022-2023 follows. Other courses may be activated during the year. In this case the candidates will be promptly informed and will be allowed to insert these new courses in their study plan.

Table A: PHD COURSES CHARACTERISING THE PHD PROGRAMME

Name of the Course	Professor	Academic Year	Language	Credits
Chemical Engineering Frontiers	Carlo Cavallottti	2022-2023	English	5
Chemical Development and Scale-up of Fine Chemicals	Elisabetta Brenna	2022-2023	English	5

Advanced tools for the development of catalytic processes	Luca Lietti	2022-2023	English	5
Advanced analytical methods and data analysis	Andrea Mele	2022-2023	English	5
Data science in Chemical Engineering	Alberto Cuoci Matteo Maestri Barbara Pernici Piercesare Secchi Alessandro Stagni	2022-2023	English	5
Industrial biotechnology and biocatalysis	Davide Tessaro Fabio Parmeggiani	2022-2023	English	5
Structural characterization of nanomaterials	Francesca Baldelli Bombelli Giancarlo Terraneo Claudia Pigliacelli	2022-2023	English	5

Table B SUGGESTED CROSS –SECTORAL COURSES

Course title	Professor	Academic year	Language	Credits
Strengthening Critical Spatial Thinking	Armondi	2022-2023	English	5
Approaches to Resilience: Social, Economic, Environmental and Technological Challenges of Contemporary Human Settlements	Balducci	2022-2023	English	5
English for Academic Communication	Biscari	2022-2023	English	5
Industrial skills	Biscari	2022-2023	English	5
Scientific communication in English	Biscari	2022-2023	English	5
Innovative teaching skills	Brunetto	2022-2023	English	5
Creative design thinking	Canina	2022-2023	English	5
European Culture	Cardilli	2022-2023	English	5
Professional Communication	Di Blas	2022-2023	English	5
Project Management Basics	Fuggetta	2022-2023	English	5
Power of Images and Visual Communication for Research Dissemination	Iarossi	2022-2023	English	5
Project Management (in Action)	Mancini	2022-2023	English	5
Ethical Aspects of Research on Dual-Use Technologies	Masarati	2022-2023	English	5
Research Communication. Issue mapping: exploring public debates surrounding	Mauri	2022-2023	English	5

academic topics				
How to support Complex decisions: Approaches and Tools	Oppio	2022-2023	English	5
Sulla responsabilità della Tecnica	Ossi	2022-2023	English	5
The Copernicus Green Revolution for Sustainable Development	Oxoli	2022-2023	English	5
La comunicazione nella Scienza	Paganoni	2022-2023	English	5
Practicing Research Collaboration / La pratica della collaborazione nella ricerca	Pizzocaro	2022-2023	English	5
Science, Technology, Society and Wikipedia	Raos	2022-2023	English	5
Teaching Methodologies, Strategies and Styles	Sancassani	2022-2023	English	5
Research skills	Sciuto	2022-2023	English	5
Cognitive biases and discriminations: implications, risks and opportunities	Tanelli	2022-2023	English	5
Introduction to Academic Research	Volonte'	2022-2023	English	5

6.4 Presentation of the study plan

PhD candidates must submit a study plan, which may be revised periodically (approximately every three months), in order to adequate them to possible changes in the course list, or to needs motivated by the development of their PhD career. The study plans must be approved by the PhD programme Coordinator, according to the modalities established by the Faculty Board of the PhD Programme itself.

6.5 Yearly evaluations

Candidates present their work to the Faculty Board at least once a year. In particular, the candidates must pass an annual evaluation in order to be admitted to the following PhD year. The third year evaluation establishes the candidate's admission to the final PhD defense.

As a result of each annual evaluation, the candidates who pass the exam receive an evaluation (A/B/C/D) and may proceed with the enrolment at the following year. Candidates who do not pass the exam are qualified either as “Repeating candidate”(Er) or “not able to carry on with the PhD (Ei)”. In the former case (Er), the candidates are allowed to repeat the PhD year at most once. The PhD scholarships – if any – are suspended during the repetition year. In the latter case (Ei) the candidates are excluded from the PhD programme and lose their scholarships – if any.

In case the Faculty Board holds appropriate to assign directly an exclusion evaluation (Ei) without a previous repetition year, the request must be properly motivated, and validated by the PhD School.

After the final year, candidates who have achieved sufficient results but need more time to conclude their research work and write their theses, may obtain the admission to a further year.

6.6 PhD thesis preparation

The main objective of the PhD career is the development of an original research contribute. The PhD thesis is expected to contribute to the advance of the knowledge in the candidate's research field.

The PhD study and research work is carried out, full time, during the three years of the PhD course. Stages or study periods in (Italian or international) companies or external Institutions may complete the candidate's preparation.

The resulting theses need to be coherent with the research issues developed in the Department where the PhD programme is developed.
The candidate must present an original thesis, discuss its contribution to the state of the art in the research field in the research community.
The PhD research is developed following the lead of a supervisor, who supports the candidate in the setting out and in the everyday activities regarding the thesis development.
At the conclusion of the PhD studies, the Faculty Board evaluates the candidates. Candidates who receive a positive evaluation submit their theses to two external reviewers for refereeing. If the evaluation provided by the reviewers is positive (or after the revisions required by the external reviewers), the candidates defend their thesis in a final exam, in front of a Committee composed of three members (at least two of which must be external experts).

7. Laboratories, PhD Secretary Services

PhD students in Industrial Chemistry and Chemical Engineering can attend the laboratories of the Department of Chemistry, Materials and Chemical Engineering (http://www.chem.polimi.it/) and those of the Laboratory of Catalysis and Catalytic Processes (http://www.lccp.polimi.it/) at the Energy Department.

PhD Secretary Services: Katia De Vettori, Lidia Martin

Email: Phd-CIIC@polimi.it

Phone: +39 0223994771

8. Internationalization and interdisciplinarity

Carrying out study and research activities at external laboratories is strongly recommended.
Politecnico di Milano supports joint PhD paths with International Institutions, as well as Joint and Double PhD programmes. Further information is available on the PhD School website and on the PhD programme website.
More specifically, the PhD programme in Industrial Chemistry and Chemical Engineering collaborates and has active joint PhD paths with Université Libre de Bruxelles ULB (Belgium), INPT Tolouse (France), Delft University (Netherlands) and ETH Zurich (Switzerland).
The collaboration with Delft is part of the Marie Curie project "Codobio" (https://www.codobio.eu/). This project started during 2019 and will be carried out over a period of 4 years. The main objective is to deliver a new generation of creative, entrepreneurial, highly-skilled and innovative Early Stage Researchers (ESRs) that are able to face the future transition challenges and to greatly contribute to the knowledge-based economy and digitized environment in manufacturing and society in general. In the proposed research programme, the most urgent questions in continuous downstream processing will be addressed: process control and modelling; miniaturization, scale-up and scale-down of; process design and development of integrated continuous downstream processes. The network consists of 6 academic and 3 industrial beneficiaries, and numerous partners from 9 different countries in Europe.
Additional collaborations are also active with ULB are in the fields of safety engineering, combustion biopolymers and supramolecular chemistry. Two agreements were recently signed for double doctorate students between ULB and Politecnico.

A co-tutelle doctorate agreement has been signed with the Institut National Polytechnique of Toulouse (INPT). The research activities involved in this cooperation are relevant topics in industrial and process engineering, such as Optimal design of flexible and operable biorefinery processes.
The PhD program is also frequently involved in numerous collaborations with international universities and research centers, often as project partners inside European programs (FP7, H2020 etc.) or with dedicated joint projects. As a matter of example, a brief list of other international universities with which the PhD program maintains systematic research collaborations is:

ETH Zurich	Switzerland	Numerous collaborations, which include joint publications, and exchange of PhD students and faculties. Parntner of the Marie Curie program “Codobio”.
Stanford University	USA	Numerous collaborations, which include joint publications, and exchange of PhD students and faculties.
MIT Boston	USA	Numerous collaborations, which include joint publications, and exchange of PhD students and faculties supported by the “Progetto Rocca MIT-Politecnico”
Cambridge University	UK	Numerous collaborations, which include joint publications, and exchange of PhD students and faculties.
Ghent University	Belgium	Joint research activities inside EU H2020 projects, and previous Marie Curie programs.
Delft University	The Netherlands	Numerous different joint research activities, usually associated to ongoing EU H2020 projects, and Marie Curie program “Codobio”.
Université Libre de Bruxelles	Belgium	Collaborations and co-tutelle PhD positions are active with ULB in the fields of safety engineering, combustion biopolymers and supramolecular chemistry.

Interaction with and exposure to non-academic sectors provides significant benefits to doctoral candidates as well as to research and innovation intensive employment sectors. Direct exposure to the challenges and opportunities in non-academic sectors of the economy and society at large is fostered by networking, connectivity, inter-sectoral mobility and wide access to knowledge. In particular, the PhD programme in Industrial Chemistry and Chemical Engineering collaborates with the following Research Agencies and/or Industrial partners.
Pirelli Tyre SpA: it is part of the Pirelli Group and one of the largest operator in the tyre market worldwide, particularly in high range segments with a high technological content. This company therefore invests significantly in R&D, and has collaborations with several universities and research centres, depending on the various specializations and the numerous research themes that are relevant

for the tyre technology field. Joint research activities are carried out both in the company laboratories in the CMIC department of Politecnico, on the basis of the agreement between Pirelli for the PhD program in Industrial Chemistry and Chemical Engineering of Politecnico di Milano.
Humanitas collaborates with the PhD programme in Industrial Chemistry and Chemical Engineering on research about the role of the physicochemical microenvironment in biofilm formation structure-function relationships in both chemical and biological systems. Both partners provided funding for several scholarships to the PhD program in Industrial Chemistry and Chemical Engineering.
ENI SpA supports different PhD positions in the PhD programme in Industrial Chemistry and Chemical Engineering, promoting researches on biomass pyrolysis and plastic waste recycle, reforming processes and vapor-liquid equilibria of mixtures involved in biofuel production. Moreover, the engineering company Jacobs collaborates with the PhD programme in Industrial Chemistry and Chemical Engineering on research about chromatographic processes. Finally, the pharmaceutical company Bracco SpA collaborates with the PhD programme in Industrial Chemistry and Chemical Engineering with the direct support of two PhD positions on the synthesis of innovative contrasting agents.

Attachment A1 – PhD Programme Coordinator

Prof. Carlo Alessandro Cavallotti, full Professor at Politecnico di Milano, Department of Chemistry, Materials and Chemical Engineering “G. Natta”

Training and education

• 1995, Laurea (5 years degree) in Chemical Engineering (grade 100/100 cum laude) at Politecnico di Milano, Italy.

• 2000, Dottorato di ricerca (Ph.D.) in Chemical Engineering at Politecnico di Milano, Italy under the advisorship of Prof. S. Carrà and M. Masi. Thesis title: ‘Chemical Engineering aspects in material synthesis by gas phase deposition’

Professional experiences

• September 1999 – September 2006: Assistant professor in applied physical chemistry at Dept. Chemistry, Materials and Chemical Engineering, Politecnico di Milano, Italy.

• September 2006 – November 2018: Associate professor of Chemical Engineering Principles at Dept. Chemistry, Materials and Chemical Engineering, Politecnico di Milano, Italy.

• November 2018-now: Full professor of Chemical Engineering Principles at Dept. Chemistry, Materials and Chemical Engineering, Politecnico di Milano, Italy.

International Fellowshisps

• March 1998-October 1998: visiting student in the research group of prof. K. F. Jensen at the Massachusetts Institute of Technology.

• March 2000-March 2001: post-doctoral associate fellow in the research group of prof. K. F. Jensen at the Massachusetts Institute of Technology.

• March 2016 - November 2016: Visiting Scientist at Argonne National Laboratories, Lemont, IL.

Teaching Activities

Teaching activities for students in chemical engineering and safety engineering (chemical kinetics, fluid mechanics, thermodynamics). Teaching activity in national and international schools for PhD students in the field of molecular modeling.

Awards and Recognitions

• 1994/5: winner of the 'Fondazione Famiglia Legnanese' prize for academic excellence.

• 2000: XII Italian National Award "Federchimica - per un futuro intelligente".

• 2008: selected by Accademia dei Lincei, and by the Inter Academy Panel (IAP) to represent Italy at the World Economic Forum in the session devoted to Young Scientists.

• 2010: invited to join the Global Young Academy, a world academy collecting top young scientists with the aim ‘to unlock the potential of young scientists from around the world’ https://globalyoungacademy.net/)

Editorial Activity

• Member of the editorial board for Polymers (MDPI) from 12/2009 to now;

• Member of the editorial board for International Journal of Chemical Kinetics (Wiley): from 01/2013 to 12/2015;

• Member of the editorial board for The open Crystallography Journal (Bentham Science) from 12/2009 to 11/2012

Invited presentations and keynote lectures: 23

Participation to national/international research projects (about 1000 keuro of financial support from EU/national agencies)
• Nanophoto, Strep project, Sixth framework programme, priority 3-NMP, 'Nanocrystalline silicon films for photovoltaic and optoelectronic applications', proposal/contract no: 013944; 2005-2009. 280 keuro. (principal investigator)
• Aims, IP project, Sixth framework programme, priority 'Nanotechnology and Nanoscience', 'advanced interactive materials by design', proposal/contract no.: IP 500160-2 AIMs; 2004-2009. 310 keuro. (principal investigator)
• Simbad, Cariplo foundation project; 'Simulation, diagnostic and Modeling of an innovative CVD process, activated by low-energy-high density plasmas'. 2006-2008. 53 keuro (principal investigator)
• COST project "Unfolding Structure and Energetics of Guanidinium Binding: The Anatomy of an Important Supramolecular Anchor Group by Concerted Theoretical and Experimental Approaches" (D31/0018/05); 2006-2009. (principal investigator)
• Molecular design of selective membranes for biomolecules purification, relevant national research project program, PRIN 2008; protocol number 20085M2L3T_004; (March 2010-March 2012) 43 keuro (principal investigator)
• Coordinator and promoter of Laboratory of Molecular Modeling at Politecnico di Milano. 100 keuro (2016).
• SemI40. Power Semiconductor and Electronics Manufacturing 4.0. ECSEL-IA 692466-2 (2016-2019). Horizon 2020.165 keuro. (local unit coordinator).
• ARES - A Road from Earth to the Stars, relevant national research project program, PRIN 2020; protocol number 202082CE3T_003; (March 2022-March 2025) 132 keuro (principal investigator)

Participation to research projects funded by private companies as principal investigator (about 600 keuro of financial support).
• 'Ab initio PFOA alternative surfactants characterization', Solvay Selexis; 20 keuro, 2007-2008.
• 'Innovative Technologies for the valorisation of stranded gases', ENI; 183 keuro, 2008-2009.
• 'Heavy oil upgrading using Plasmas', ENI; 250 keuro. 2009-2010.
• 'Optimization of Silicon deposition in Siemens reactors', Memc; 50 keuro 2008-2010.
• 'Processing of gases using non thermal plasmas', ENI; 65 keuro, 2016.

Other presentations at international conferences/workshops/meetings: more than 50 given between 1997 and 2018.
Supervised Master theses: more than 60.
Supervised PhD thesis/post-doc Scholars: 18
Publications
Papers on ISI journals: 135.
Book Chapters: 16
Google Hirsch Index: 36.
Scopus Hirsch Index: 32.

Attachment A2 – PhD Faculty Board

Description of the composition of the Faculty Board

Name	Affiliation	Scientific Disciplinary Sector
Cavallotti Carlo (coordinator)	Politecnico di Milano	ING-IND/24 Fundamentals of chemical engineering
Baldelli Bombelli Francesca	Politecnico di Milano	CHIM/07 Chemical foundations of technologies
Beretta Alessandra	Politecnico di Milano	ING-IND/27 Chemical technologies
Bozzano Giulia	Politecnico di Milano	ING-IND/24 Fundamentals of chemical engineering
Brenna Elisabetta	Politecnico di Milano	CHIM/07 Chemical foundations of technologies
Busini Valentina	Politecnico di Milano	ING-IND/24 Fundamentals of chemical engineering
Cellesi Francesco	Politecnico di Milano	ING-IND/23 Applied physical chemistry
Cuoci Alberto	Politecnico di Milano	ING-IND/24 Fundamentals of chemical engineering
Frassoldati Alessio	Politecnico di Milano	ING-IND/25 Chemical plants
Galimberti Maurizio	Politecnico di Milano	CHIM/07 Chemical foundations of technologies
Gatti Francesco	Politecnico di Milano	CHIM/06 Organic chemistry
Lietti Luca	Politecnico di Milano	ING-IND/27 Chemical technologies
Manca Davide	Politecnico di Milano	ING-IND/26 Analysis, design and control of chemical processes
Maestri Matteo	Politecnico di Milano	ING-IND/27 Chemical technologies
Mele Andrea	Politecnico di Milano	CHIM/07 Chemical foundations of technologies
Mehl Marco	Politecnico di Milano	ING-IND/25 Chemical plants
Metrangolo Pierangelo	Politecnico di Milano	CHIM/07 Chemical foundations of technologies
Morbidelli Massimo	Politecnico di Milano	ING-IND/23 Applied physical chemistry
Moscatelli Davide	Politecnico di Milano	ING-IND/23 Applied physical chemistry
Nova Isabella	Politecnico di Milano	ING-IND/27 Chimica Industriale e Tecnologica
Punta Carlo	Politecnico di Milano	CHIM/07 Chemical foundations of technologies
Resnati Giuseppe	Politecnico di Milano	CHIM/07 Chemical foundations of technologies
Sironi Selena	Politecnico di Milano	ING-IND/23 Applied physical chemistry
Tronconi Enrico	Politecnico di Milano	ING-IND/27 Chemical technologies

Attachment A3 – PhD Advisory Board

Description of the composition of the Advisory Board

Name	Affiliation
Margherita Albano	Solvay Specialty Polymers
Paolo Pollesel	ENI S.p.A.
Paolo Vacca	SAES-Getters S.p.A
Vincenzo Guida	Procter & Gamble
Dario Lazzari	Miteni
Raffele Ostuni	Casale SA (Switzerland)
Renato Paludetto	Dow
Gianmarco Polotti	Data How A.G. (Switzerland)

Each year the Advisory Board attends the new edition of the "PhD day" of the PhD in Industrial Chemistry and Chemical Engineering, where they produce a report about the students' work and assign a prize to the best thesis.