



POLITECNICO
MILANO 1863

Chemical Engineering

Open Day 2025

SCHOOL of INDUSTRIAL and INFORMATION ENGINEERING

Matteo Pelucchi

<http://www.ccs-chimica.polimi.it/>



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Chemical Engineering: *Context and Challenges*



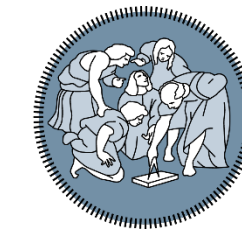
Sustainable Development Goals



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SDG and Chemical Engineering



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SDG and Chemical Engineering



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- **Fertilizers**
- **Food & Beverage:** sustainable products and processes
- **Packaging** and packaging **recycle**



- **Water treatment** technologies
- **Desalting** of ocean water
- Optimization of **water consumption** in production processes



- **Hydrogen** production and use
- **Batteries** and fuel cells
- **Sustainable fuels** production (E-fuels, bio-fuels, ammonia)
- **Wastes conversion, biogas** production



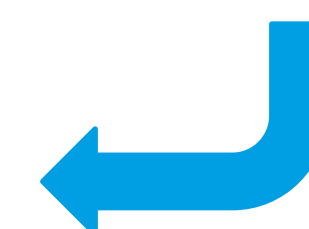
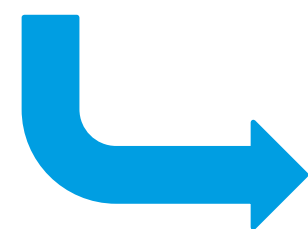
- **Waste materials recycle** (plastics)
- **Bio-polymers** and bio-plastics production
- **Optimization** of processes (to include recycling capabilities)



- **Pollutants reduction** and **abatement**
- Carbon capture sequestration, utilization and storage (**CCSU**)
- Design and optimization of **cleaner processes**



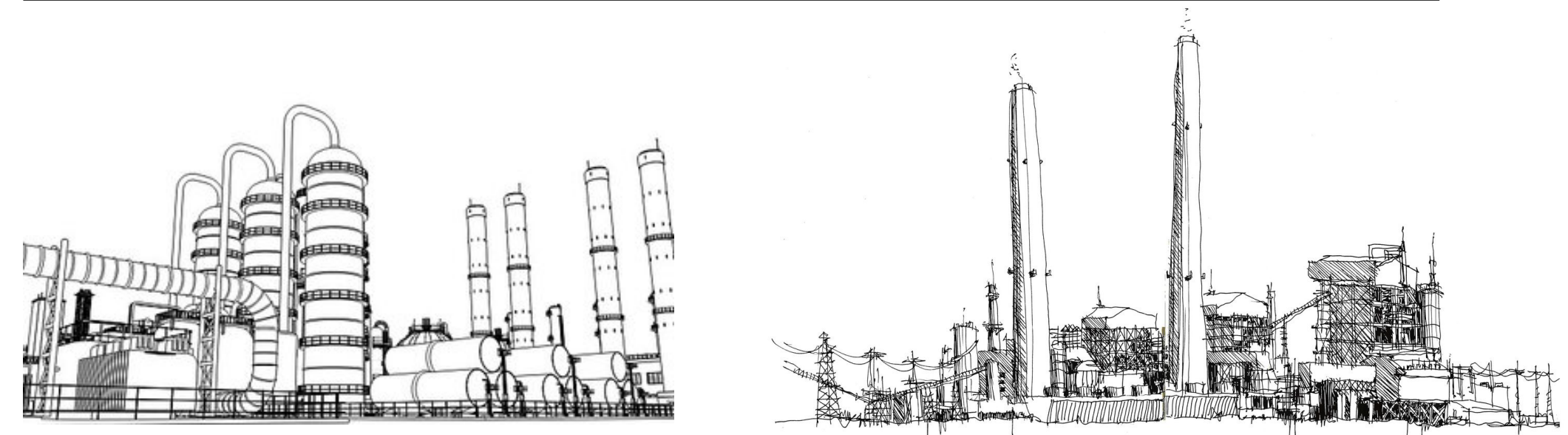
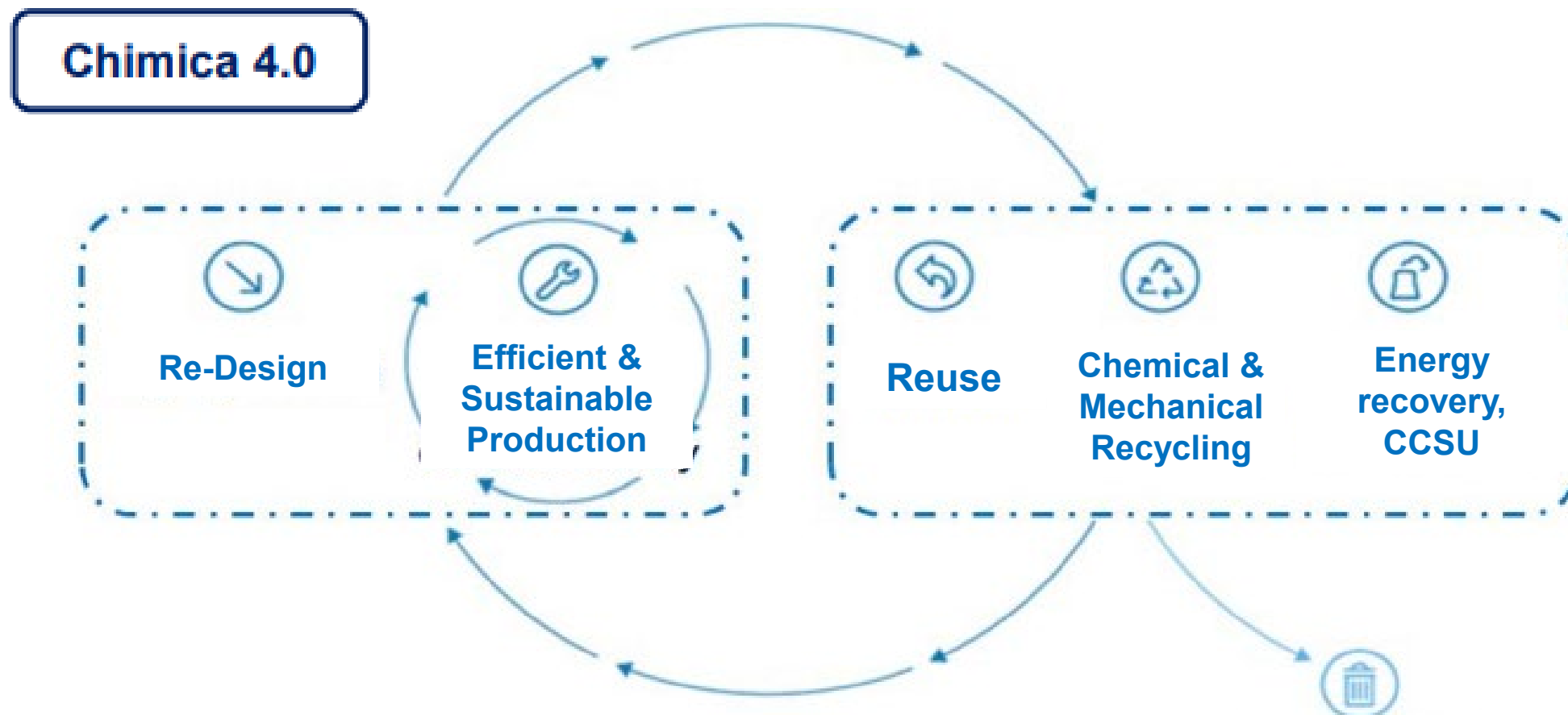
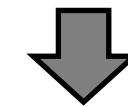
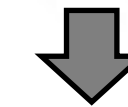
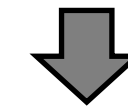
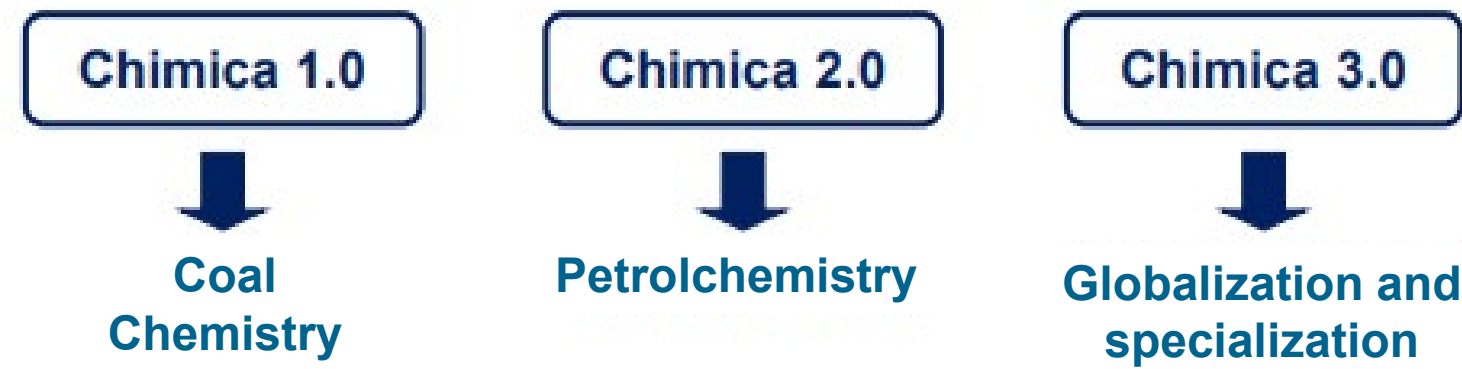
- **Vaccines** and drugs availability
- **Process intensification** and flow chemistry
- **Process adaptation** and flexibility
- **Job creation** from new markets



Chemical industry: the big picture



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Chemicals, Fuels, Commodities, Materials

Power & Electricity



Waste streams from thermal valorization

Fonte: VCI (Verband der Chemischen Industrie) & Deloitte, Federchimica; anno 2017, ultimo anno disponibile





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Chemical Engineering @POLIMI *Some numbers*

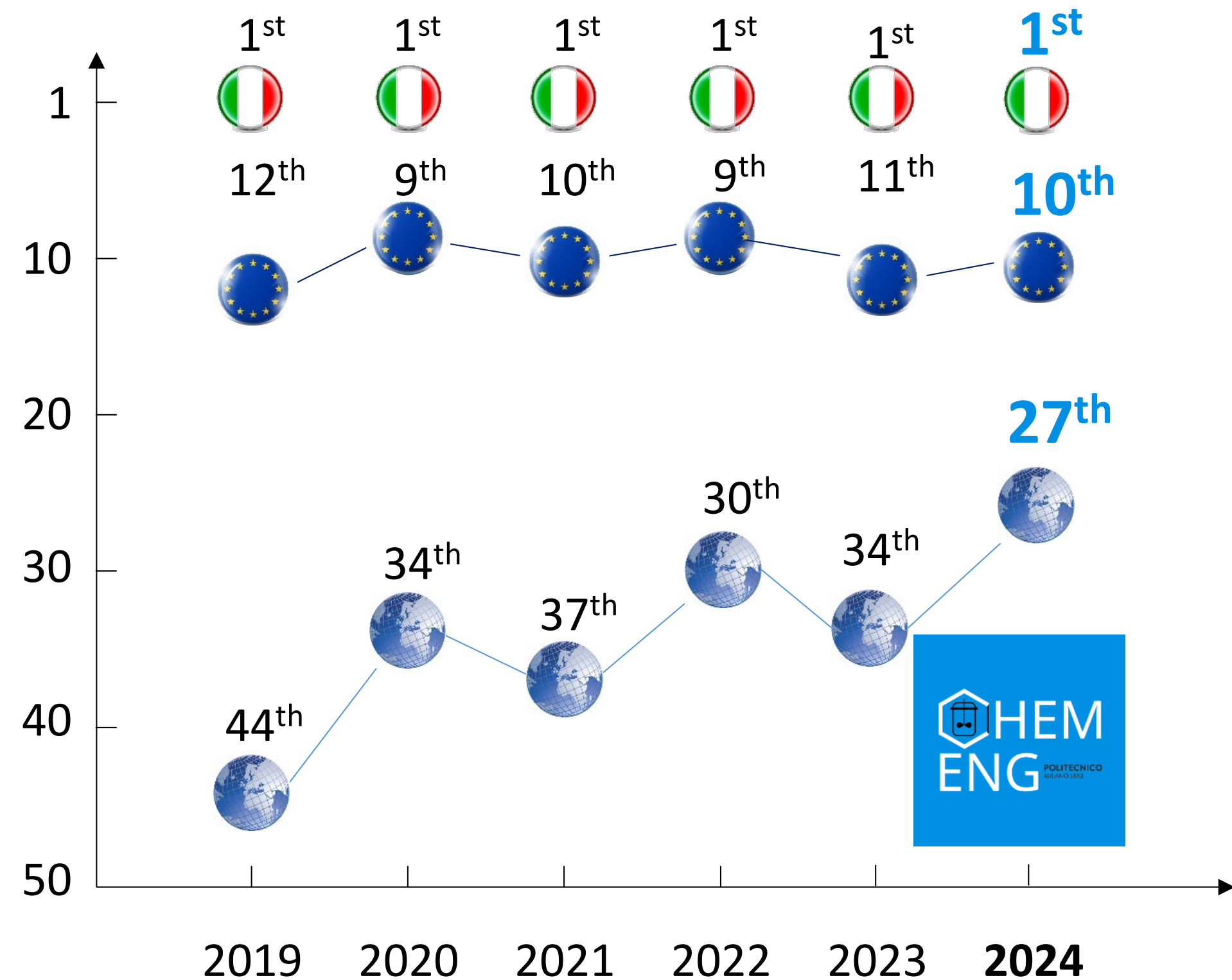
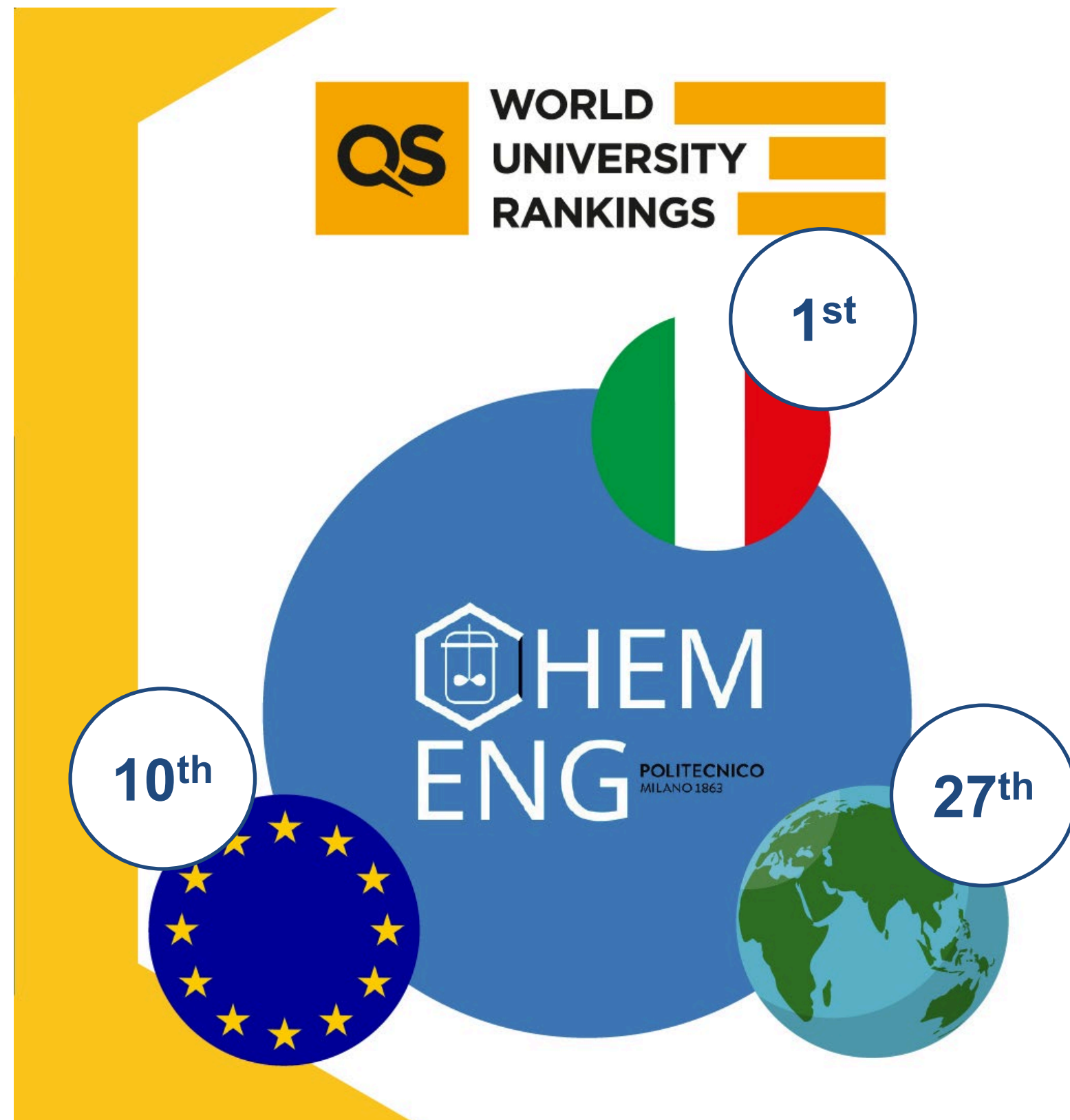


International Rankings



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PoliMi, an Italian, European and World leading university



*12th in Engineering – Petroleum Worldwide

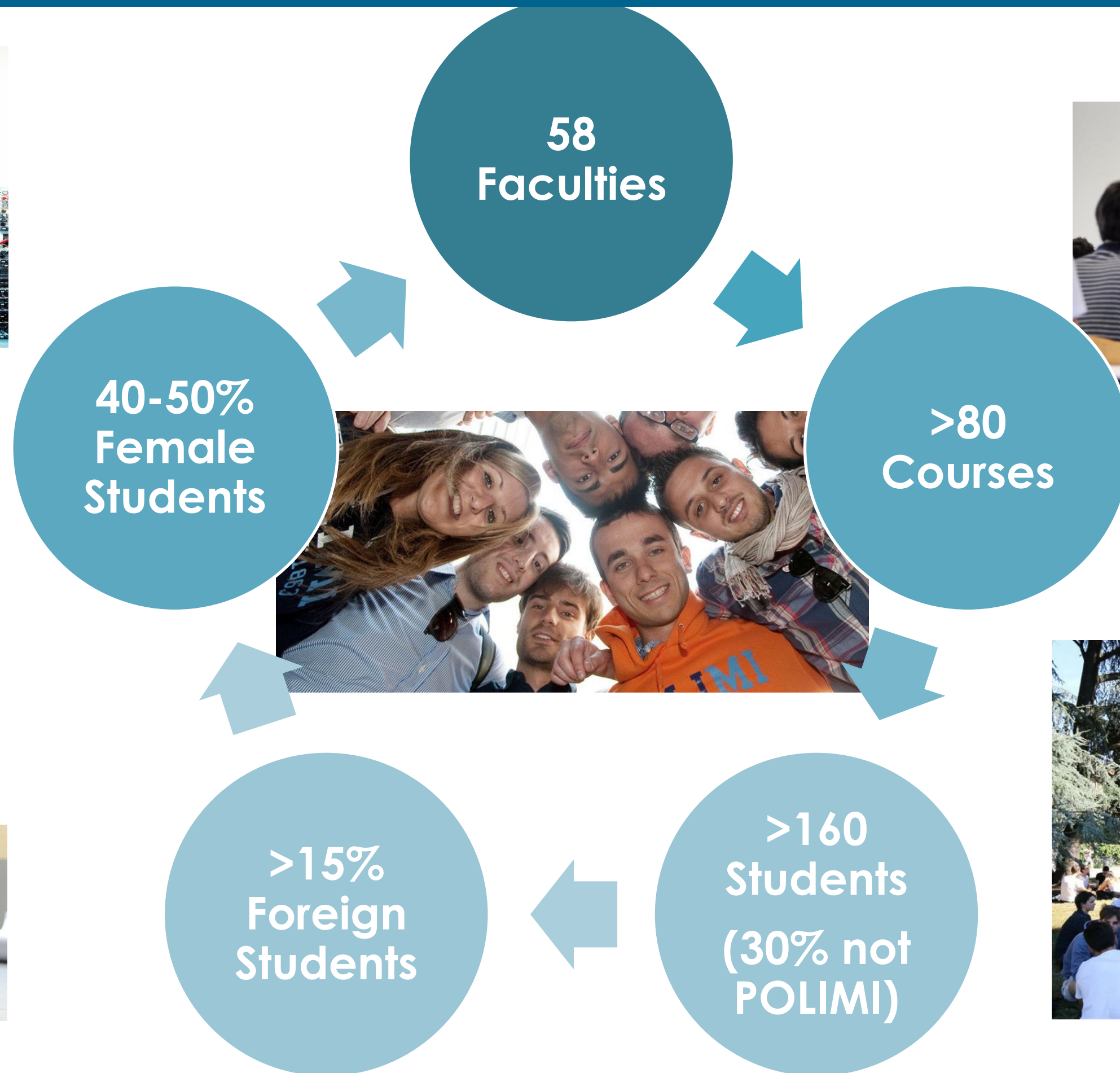


Master Degree in Chemical Engineering

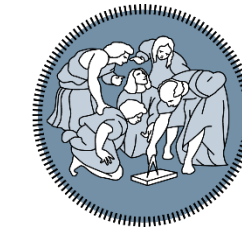


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<https://www.ccs-chimica.polimi.it/>



What do students say about us?



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Graduated students in Chemical Engineering

- ~94% is completely satisfied by the education career
- 97% «Degree fits work» rating (among the highest at PoliMi)
- ~90% would chose PoliMi again



On average, our graduates are more satisfied about their education compared to other PoliMi students!

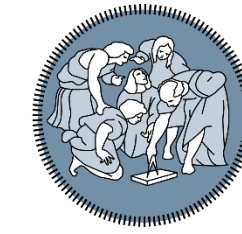




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Chemical Engineering @POLIMI *Job Opportunities and Employability*

Job opportunities



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Chemical Industry

Pharmaceutical Industry

Energy and Renewables Industry

Materials industry

Transport Industry

Safety

Research

Petrochemical Industry

Oil&Gas Industry

Cosmetics Industry

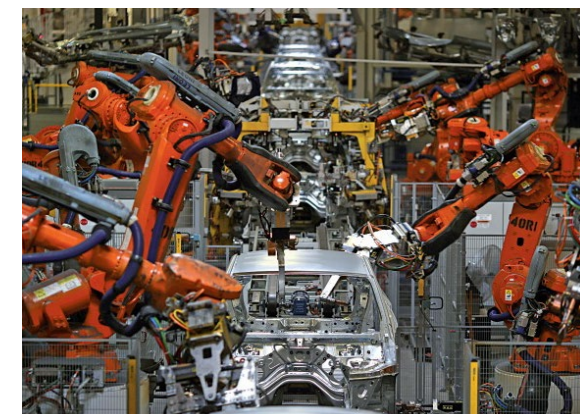
Textile Industry

Food&Beverage Industry

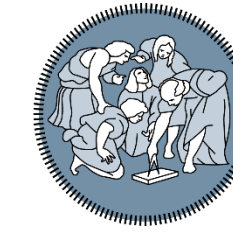
Metals Industry

Environment

Chemical engineering is process engineering: you learn methodologies of chemico-physical transformation of matter, aimed at the production of material goods, supply of services, risk prevention, reduction of environmental impact, ...



Employment Statistics (2024)



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CHEMICAL ENGINEERING

Nel 2022 hanno conseguito la laurea magistrale in Chemical Engineering 122 studenti di cui 109 italiani e 13 internazionali. Hanno risposto all'indagine in 101.

TASSO DI OCCUPAZIONE*



99%

* calcolato su occupati, disoccupati, in cerca di una nuova occupazione

OCCUPATI ENTRO 6 MESI*



95%

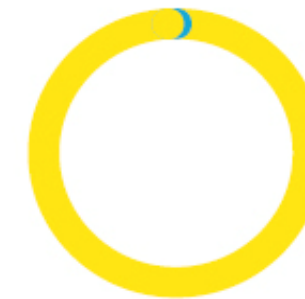
* percentuale su chi è occupato a 1 anno dalla Laurea

GUADAGNO MENSILE NETTO



€2.073

RAPPORTO DI LAVORO



- 99% Dipendenti
- 1% Autonomi

TIPOLOGIA DI CONTRATTO



- 71% T. Indeterminato
- 3% T. Determinato
- 5% Apprendistato
- 1% Stage
- 20% Altro*

* Inserimento/a progetto/collaborazione

DIMENSIONE AZIENDA



- 48% 1-250
- 19% 251-1000
- 33% +1000

DOVE LAVORANO

10% Italiani che lavorano all'estero

- Internazionali che lavorano in Italia

PRIMI 3 SETTORI

- 20% Oil & Gas
- 14% Meccanica e Impiantistica
- 13% Chimica

TOP 4 AREE DI COMPETENZA

- 68% Progettazione
- 18% Ricerca e Sviluppo
- 18% Pianificazione
- 18% Qualità e Controllo

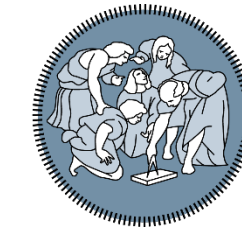


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ChemEng@Polimi


Programme structure

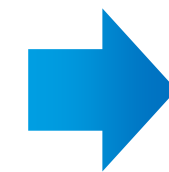
ChemEng @ PoliMi



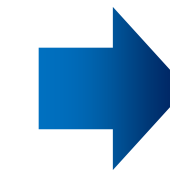
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Others


Laurea –
Bachelor of Science
Ingegneria Chimica
(3 years, 180 CFU)




Laurea Magistrale –
Master of Science
Chemical Engineering
(2 years, 120 CFU)




Dottorato di Ricerca –
Doctor of Philosophy (PhD)
*Industrial Chemistry and
Chemical Engineering*
(3 years)

• In English since 2014

• **NEW topical tracks!!!!!!**

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Context and Motivations

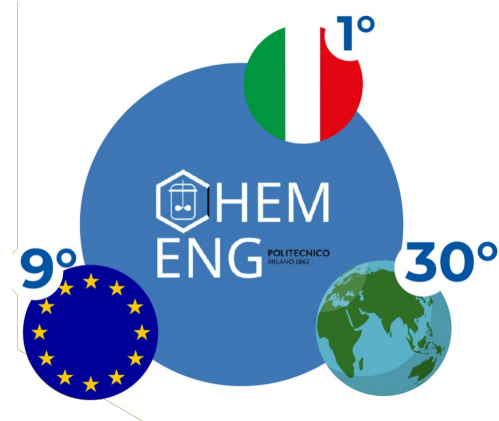
Master of Science in Chemical Engineering



Sustainability Goals:
New challenges
Ambitious objectives



Market Needs:
New technologies
New competencies



A top-ranked University:
Excellence
Leadership
Internationalization

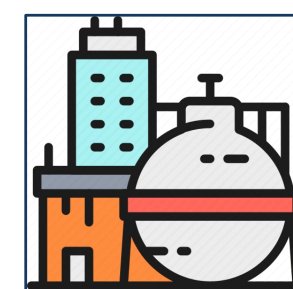
1st Year (60 CFU)

Chemical and Catalytic Reaction Engineering
Advanced Transport Phenomena
Applied Physical Chemistry
Chemical Plants and Process Operations Management
Process Systems Engineering A+B
Processes of the Organic Chemical Industry

2nd Year (40 CFU)

Tracks: 25 CFU mandatory + 15 CFU eligible

+ Master Thesis Project (20 CFU)



Process Design

Advanced knowledge and technical tools to operate in the various areas of process engineering (e.g. design equipment, control)



Environment & Energy

advanced knowledge and tools on chemical engineering applications for technologies for environmental protection, for the energy sector and for energy transition



Biochemical & Pharma

Advanced knowledge and technical tools to operate in the pharmaceutical and biotechnology industry



Research & Development

Advanced knowledge related to fundamental subjects of chemical engineering for research, technological development, and innovation

New courses and topics + Laboratory Activities + Innovative Teaching

ChemEng @ PoliMi: structure



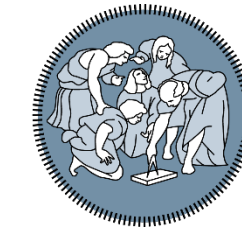
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1st Year, 60 CFU

	Course (mandatory)	CFU
I Sem	Chemical Plants and Process Operations Management	10
	Advanced Transport Phenomena	10
	Applied Physical Chemistry	10
II Sem	Chemical and Catalytic Reaction Engineering	10
	Process Systems Engineering A	5 +
	Process Systems Engineering B	5
	Processes of the Organic Chemical Industry	10
		60



Environment and Energy



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Learning objectives:

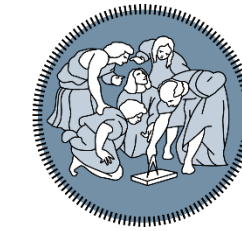
- To provide the knowledge and tools related to the key role of chemical engineering in the context of environmental protection and energy production technologies
- The knowledge must cover both standard technologies (e.g. oil and gas industry) and those related to the energy transition (green chemistry, sustainability, etc.)

Mandatory courses (25 CFU)

	Scientific Sector (SSD)	
• 5 CFU. Catalysis for Energy & Environment	- ING-IND/27	I Sem
• 5 CFU. Thermochem. Proc. for Carbon Neutral En. Transfor.	- ING-IND/25	
• 5 CFU. Electrochem. Tech. for Energy Production and Storage	- ING-IND/23	
• 5 CFU. Environmental Impacts	- ING-IND/23	
• 5 CFU. Life Cycle Assessment of Materials and Processes	- ING-IND/22	II Sem

2nd Year, 25 CFU mandatory + 15 CFU eligible + 20 CFU Thesis

Process Design



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Learning Objectives:

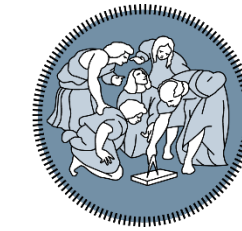
- To provide the knowledge and tools required by the many and different areas of chemical processes engineering
- The knowledge included the design of facilities and equipments, of chemical plants, their simulation, control and operation, together with economic and management aspects.

Mandatory Courses (25 CFU)

		Scientific Sector	
• 5 CFU.	Sust. process design for nat. gas and energy carriers	- ING-IND/25	I Sem
• 5 CFU.	Proc. Control & Instrum. Lab.	- ING-IND/27	
• 5 CFU.	Process Design: Principles and Methods	- ING-IND/25	
• 5 CFU.	Dynamics and Control of Chem. Processes	- ING-IND/26	II Sem
• 5 CFU.	Mechanical Systems Dynamics	- ING-IND/13	

2nd Year, 25 CFU mandatory + 15 CFU eligible + 20 CFU Thesis

Biochemical and Pharma



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Learning objectives

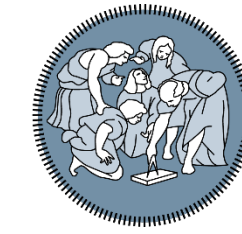
- To provide the knowledge and tools required by the many areas related to biotechnologies, health and care and in particular of the pharmaceutical and biotechnology industry
- The knowledge includes: processes and equipments of the pharmaceutical industry, DS/DP and packaging, regulatory aspects, process development and technology transfer

Mandatory Courses (25 CFU)

		Scientific Sector	
5 CFU.	Flow Chemistry	- ING-IND/25	I Sem
5 CFU.	Formulation Engineering	- ING-IND/23	
5 CFU.	Manufacturing of Biopharmaceuticals	- ING-IND/23	
5 CFU.	Pharmaceutical Chemistry Technology	- CHIM/07	
5 CFU.	Nanomedicine and Pharmaceutical Innovation	- ING-IND/23	II Sem

2nd Year, 25 CFU mandatory + 15 CFU eligible + 20 CFU Thesis

R&D for industrial applications



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Learning Objectives:

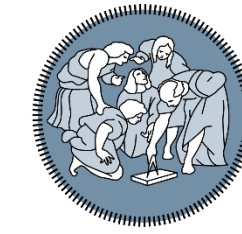
- To provide the advanced knowledge of chemical engineering fundamental aspects required by industrial research practices
- The knowledge covers both methodological approaches and specific contents related to chemical kinetics, catalysis, mathematics, chemistry and advanced separation processes

Mandatory Courses (25 CFU)

		Scientific Sector	
• 5 CFU.	Advanced Mathematical analysis	- MAT/05	I Sem
• 5 CFU.	Methods for Catal. Kinetic Investigation	- ING-IND/27	
• 5 CFU.	Chemical Kinetics and Dynamics: Theory and App.	- ING-IND/24	
• 5 CFU.	Adsorption and Membrane Separations	- ING-IND/23	II Sem
• 5 CFU.	Applied Chemistry for Technologies	- CHIM/07	

2nd Year, 25 CFU mandatory + 15 CFU eligible + 20 CFU Thesis

International Mobility



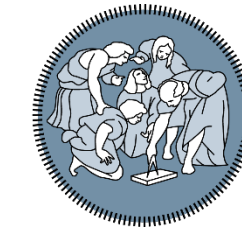
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Course (Mandatory)	CFU
Chemical and Catalytic Reaction Engineering A	5
Advanced Transport Phenomena A	5
Applied Physical Chemistry A	5
Chemical Plants and Process Operations Management	5
Processes of the Organic Chemical Industry A	5

Course (Mandatory)	CFU
Chemical and Catalytic Reaction Engineering B	5
Advanced Transport Phenomena B	5
Applied Physical Chemistry B	5
Chemical Plants and Process Operations Management	5
Processes of the Organic Chemical Industry B	5

For students participating to **international mobility programs** the mandatory courses (10 CFU) can be substituted by corresponding 5+5CFU courses.

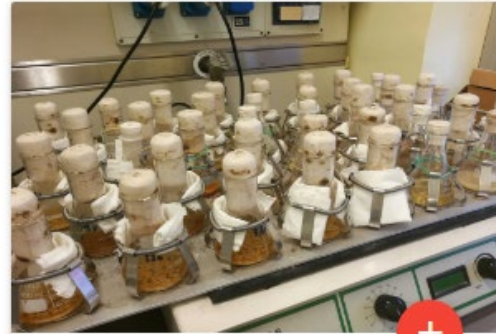
Excellence in Research (MSc Thesis)



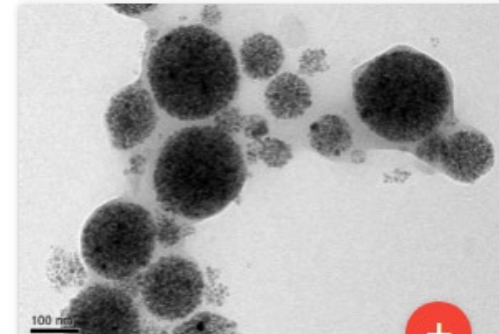
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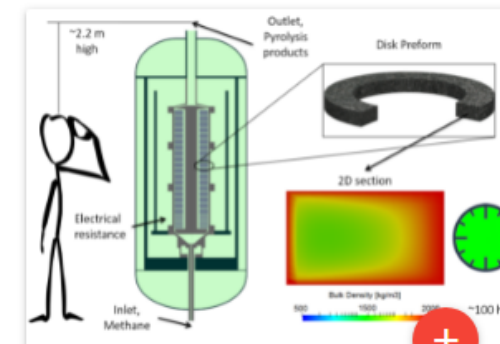
AOCL
Applied Organic Chemistry
Laboratory



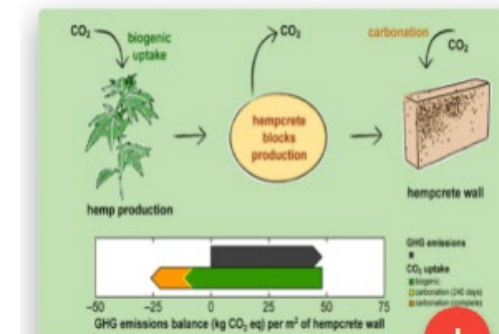
BiocatLab
Laboratorio di Biocatalisi per la
Sintesi Organica



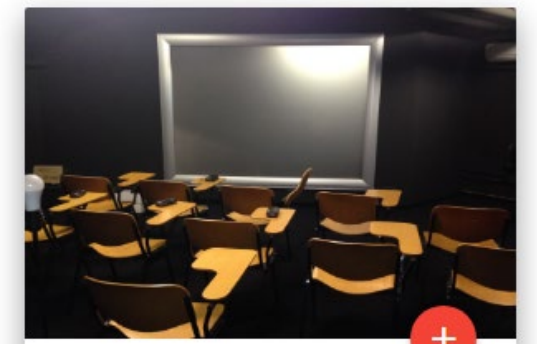
CFALab
Laboratorio di Chimica Fisica
Applicata



CRECK
Chemical Reaction Engineering
and Chemical Kinetics Group



Mat4En2
Materiali per l'Energia e
l'Ambiente



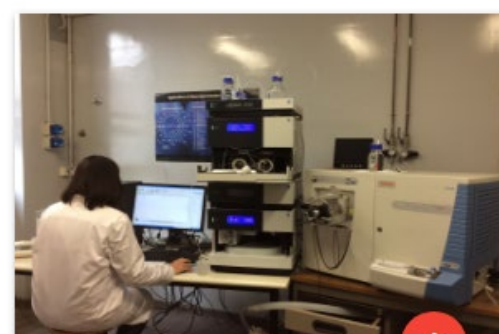
eRAM Lab
experimental Risk Assessment
and Management Lab



Fluoritech
Fluoritech Laboratory



GASP
Group on Advanced Separation
Processes & GAS Processing



ISCaMaP
Innovative Sustainable
Chemistry and Materials and
Proteomics



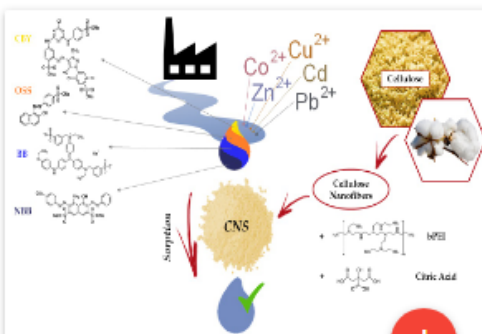
Laboratory
of Catalysis and
Catalytic Processes **LCCP**



NMR Group
NMR Group



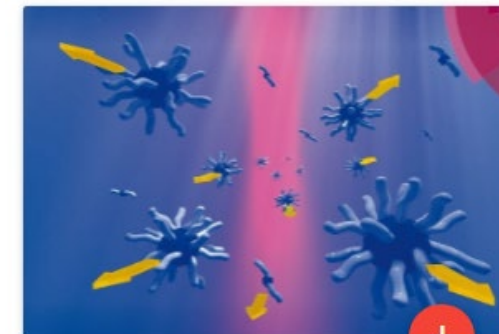
Olfattometrico
Laboratorio Olfattometrico



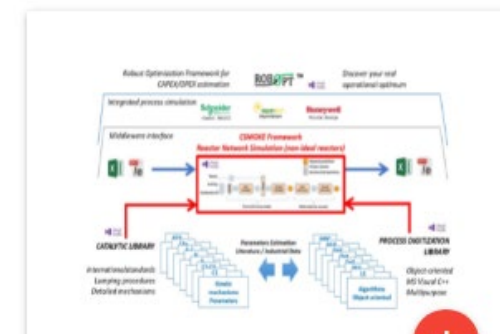
OrganicSCM Lab
Organic Synthesis, Catalysis, and
Materials Laboratory



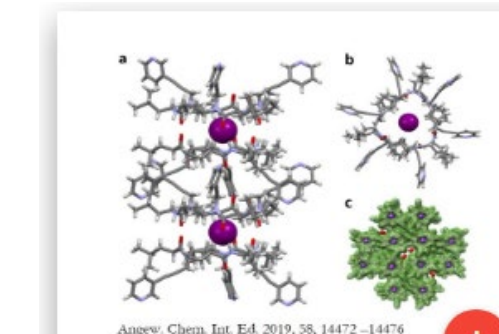
SEE lab
Surface and Electrochemical
Engineering Laboratory



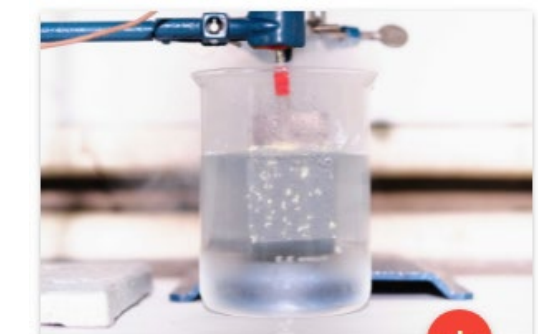
Soft Matter
Laboratorio Soft Matter



SUPER TEAM
Sustainable Process Engineering
Research Team



SupraBioNanoLab
Laboratory of Supramolecular
and Bio-Nanomaterials



SurfaceLAB
Laboratorio di Ingegneria delle
Superfici ed Elettrochimica
Applicata "Roberto Piontelli"

PhD in Industrial Chemistry and Chemical Engineering



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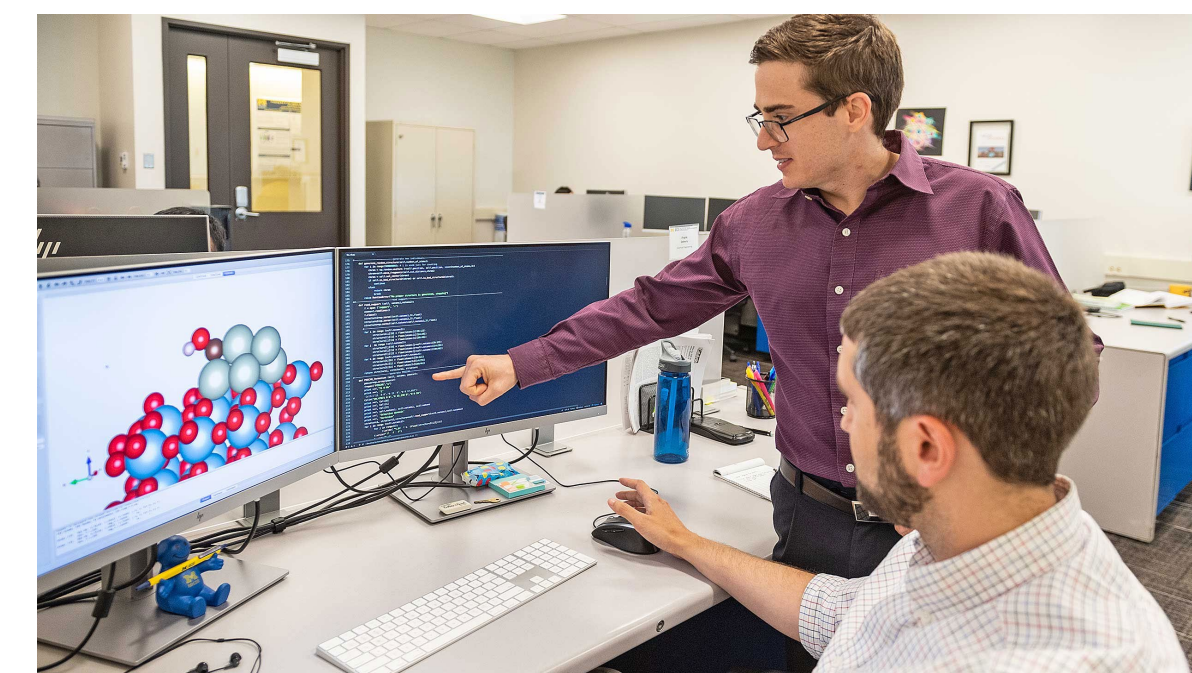
<http://phd.chem.polimi.it/>
<http://www.dottorato.polimi.it/>

The **Ph.D. Programme in Industrial Chemistry and Chemical Engineering** offers students and executives opportunities to **develop solutions to global challenges by performing cutting-edge research** in three main areas:

- **Energy, Safety and Environment**
- **Health and Life Sciences**
- **Smart and Sustainable Industry**

Research activities span from the **nano/micro scale up to the macro scale** and cover any fields of Industrial Chemistry and Chemical Engineering: from **chemical synthesis** to the characterization and transformation of matter, the development of **new materials**, to safe and **innovative technologies** for **sustainable process development** and design, from **experimental research to numerical modelling** of chemical processes and phenomena.

The Doctoral Programme... a strategic resource for Industry



Contacts



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Coordinatore CCS

PROF. MARCO DERUDI

Email: coordinatore-ccschimica@polimi.it
marco.derudi@polimi.it

Rappresentanti degli studenti

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LINK UTILI PRIVACY

SCUOLA DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE

Corso di Studio in Ingegneria Chimica

HOME INGEGNERIA CHIMICA FUTURI STUDENTI DIDATTICA LABORATORI DOCENTI LAVORO CONTATTI

Laboratori didattici

online 19/07 ore 11
MASTER IN CHEMICAL ENGINEERING
NEW CHALLENGES NEW TECHNOLOGIES
25 Luglio 2022

online 19/07 ore 11
MASTER IN CHEMICAL ENGINEERING
NEW CHALLENGES NEW TECHNOLOGIES
14 Luglio 2022

CHIMICA una buona scelta
QS Ranking 2022
22 Aprile 2022

LIVE WEBINAR
L'Ingegneria Chimica, la Sostenibilità dei Processi e dei Prodotti
15 Aprile 2022

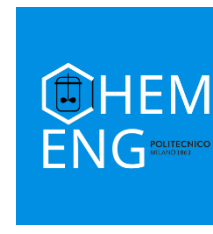
Open Day 2022 – Un grande successo
12 Aprile 2022

<http://www.ccs-chimica.polimi.it/>

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<http://www.ccs-chimica.polimi.it/contatti>

Valutazione delle carriere per l'accesso alla Laurea Magistrale



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Prof. Alberto Cuoci (Studenti stranieri)

Email: ✉ ammissioni-ccschimica@polimi.it

Tel: (+39) (022399)3283

Piani di Studio



Prof. Giulia Bozzano (Laurea Triennale)

Email: ✉ pianidistudio-ccschimica@polimi.it

Tel: (+39) (022399)3094



Prof. Lidia Castoldi (Laurea Magistrale)

Email: ✉ pianidistudio-ccschimica@polimi.it

Tel: (+39) (022399)3255

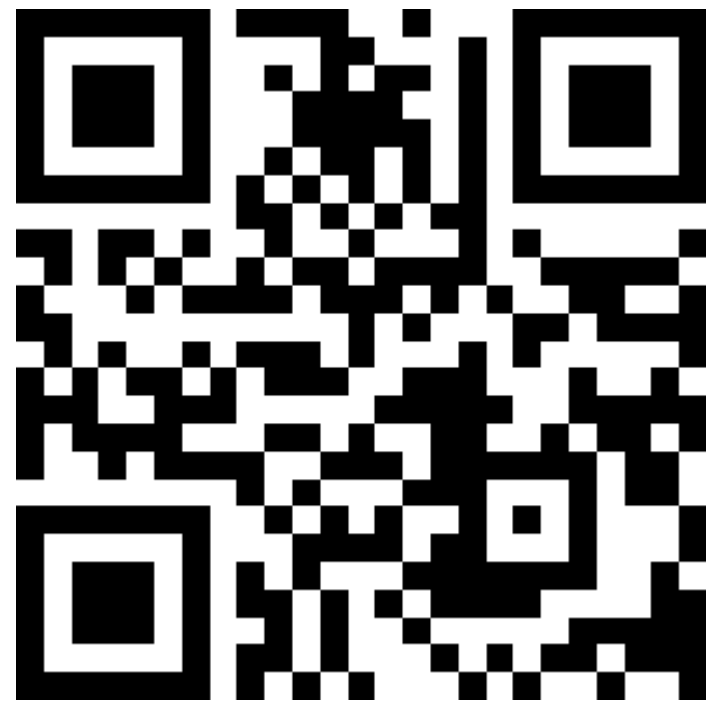
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chemengpolimi



chemeng_polimi



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