

CHEMICAL INNOVATION AND REGULATION FOR SUSTAINABILITY



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



UNIVERSITAT DE
BARCELONA



Joint degree:

Mestre em *Inovação Química, Regulamentação e Sustentabilidade*, in Portugal

Master Universitario Erasmus Mundus en Innovacion y Regulacion en Quimica para la

Sostenibilidad / Master Universitari Erasmus Mundus en Innovacio i Regulacio en Quimica

per la Sostenibilitat, in Spain

Laurea Magistrale in *Chemical Innovation and Regulation for Sustainability*, in Italy

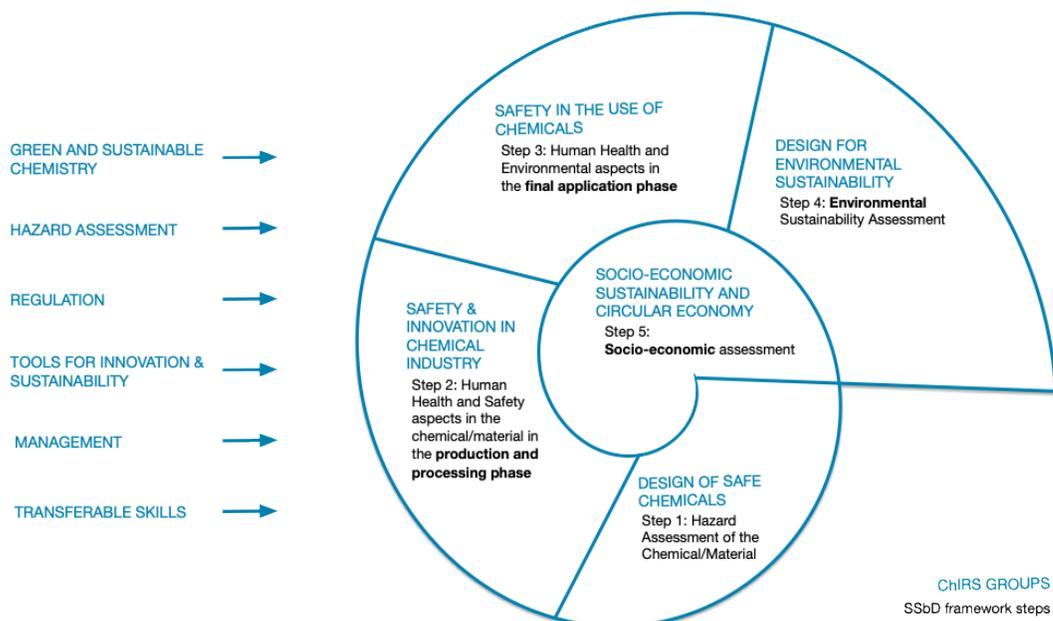
Magister, in Poland



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ChIRS prepares professionals with the **scientific, regulatory and economic** knowledge necessary to manage the risks of chemicals and to meet responsibilities over chemical legislation worldwide.

The programme deals with innovation and recent trends on chemical circular economy and sustainability, chemical safety and international chemical regulations



Upon successful completion of the ChIRS programme, graduates will be able to:

- Have a thorough understanding of **international regulations** on the use of chemical substances and the Safe and Sustainable by Design framework of the European Union.
- Have a comprehensive knowledge of the principles behind **designing new safe and sustainable chemical products**.
- Develop **business models** for new sustainable chemical products.
- Understand the principles of industrial implementation of **new sustainable processes**.
- **Assess environmental hazards** of chemical substances.
- **Assess human health hazards** of chemical substances.
- **Evaluate chemical and physical hazards** with a focus on risk management strategies.
- Understand the **global economy of the chemical industry** with an emphasis on sustainable practices.
- Effectively **communicate and collaborate** in a global chemicals management context.

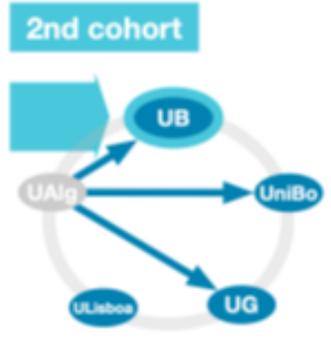
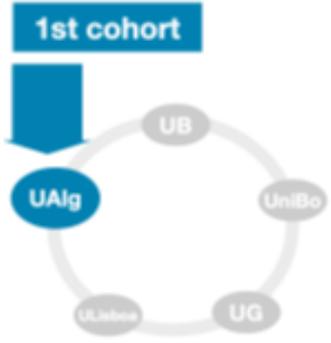


Student mobility is required and embedded in the program structure!



Programme Structure

For the academic year 2026-2027 the host university will be **University of Algarve**



1st year: Classes and curricular activities (60 ECTS) in the host university

2nd year: Internship, research project and thesis (60 ECTS) in one/two other countries of the consortium.



1st cohort		Path 1	Path 2	Path 3	Path 4	Path 5			
<i>min-max # mobilities:</i>		2-3	2-3	3-4	2-3	3			
Year 1 2026/27	Curricular Year (60 ECTS)	Oct	UAIG						
		Nov							
		Dec							
		Jan							
		Fev							
		Mar							
		Apr							
		May							
		Jun							
		Jul							
		<i>summer break</i>							
Year 2 2027/28	Internship (15 ECTS)	Sep	*	*	*	*	UB, UniBo or UG		
		Oct							
		Nov							
	Project & TS (9 + 6 ECTS)	Dec	UB, UniBo or UG	UAIG or ULisboa	UB, UniBo or UG	UB, UniBo or UG	UB, UniBo or UG**		
		Jan							
		Research Thesis and Defence (30 ECTS)	Feb	UB, UniBo or UG	UB, UniBo or UG			UB, UniBo or UG	UB, UniBo or UG
			Mar						
			Apr						
			May						
			<i>summer break</i>						

*any partner: EU or non-EU Associated Partners or UAIG, ULisboa, UB, UniBo, UG or UL

** Different from the previous Host

The curriculum is organized in ten groups, covering one discipline area

Each group has three elective course units

Each course units has three modules

DS - Design of Safe Chemicals

- DS-U1 Sustainable design of chemicals
- DS-U2 Safe and sustainable by design
- DS-U3 Targeted sustainable products

- DS5 Safe and Sustainable by Design / SSbD framework
- DS2 Structure Property Relationship
- DS1 Green and Sustainable Chemical Products

SI - Safety and Innovation in the Chemical Industry

SU - Safety in the Use of Chemicals

DE - Design for Environmental Sustainability

SE - Socio-Economic Sustainability and Circular Economy

GS - Green and Sustainable Chemistry

HA - Hazard Assessment

RE - Regulation

TO - Tools for Innovation and Sustainability

MA - Management

Transferable Skills

Flexible path

10 groups, 30 course units (6ECTS), over 60 modules (2 ECTS)



Group 1	Design of Safe Chemicals	DS1 Alternative Green Products DS2 Structure Toxicity Relationship DS3 Drug Design DS4 Digital methods for developing Safe and Sustainable-by-Design (SSbD) chemicals and materials. DS5 Safe and Sustainable by Design / SSbD framework
Group 2	Design for Environmental Sustainability	DE1 Life Cycle Assessment DE2 Environmental Fate of Organic Pollutants DE3 Environmental risk of Plastic Materials DE4 Chemical Pollutant Remediation DE5 Environmental Risk Assessment of Emerging Chemicals DE6 Chemical and biological treatment of wastewater
Group 3	Safety and Innovation in Chemical Industry	SI1 Chemical Process Safety SI2 Pharmaceutical and Fine Chemicals Industry SI3 Synthesis and Properties of Inorganic Nanomaterials SI4 Sustainable biocatalytic processes SI5 Sustainable hydrogen and hydrocarbons production SI6 Chemical Products from fermentation SI7 Nanomanufacturing and Nanoprocessing SI8 Chemical Reactivity Hazards
Group 4	Safety in the Use of Chemicals	SU1 Hazard and Safety in Chemistry SU2 Design of Chemical formulations SU3 Food and Chemistry SU4 Properties of Materials and New Materials SU5 Design for Recycling
Group 5	Socio-Economic Sustainability and Circular Economy	SE1 Global Chemistry Landscape SE2 Social and economic aspects of sustainability SE3 Social Perception of the Chemical Risk SE4 Global Changes SE5 Sustainability and Circularity of Material Flows SE6 Recycling and Recovery
Group 6	Green and Sustainable Chemistry	GS1 Renewable Sources GS2 Green Metrics GS3 Alternative Green Solvents GS4 Green synthesis and Catalysis GS5 Sustainable Chemical Engineering GS6 Biopolymers

Group 7	Hazard Assessment	HA1 Toxicological Assessment HA2 Metals in toxicology and health HA3 Genotoxicity Assessment HA4 Toxicokinetics and Toxicogenetics HA5 Selected methods to study chemicals interactions with DNA HA6 Endocrine Disruptors HA7 Principles of Toxicology and Ecotoxicology
Group 8	Regulation	RE1 REACH and CLP Regulations RE2 Non-EU Regulations: Japan, Brazil and China RE3 Pharmaceuticals Regulations RE4 Biocides and pesticides regulations RE5 Food Regulations RE7 Waste Material Regulations RE8 International Law and New Ecological Legal Patterns of Environmental Protection
Group 9	Tools for Innovation and Sustainability	TO1 Measuring Variability and Statistical Decision TO2 Experimental Design TO3 Chemometrics TO4 Good Laboratory Practice TO5 OECD and related chemical procedures TO6 Environmental Analysis and Detection in the Environment TO7 Patenting New Products TO8 Industrial Forgery Detection TO9 Machine Learning, Deep Learning, and Artificial Intelligence in Chemistry: Basics and applications
Group 10	Management	MA1 Business Planning MA2 Innovation Management MA3 Entrepreneurship MA4 Quality Management MA5 Risk Management
Group 11	Transferable Skills	TS1 Intensive "Survival" Language Course TS2 Communication skills TS3 Team Building TS4 IT tools TS6 Research Skills TS7 Laboratory skills TS8 Innovation Skills TS9 Versatile oral communication and pitching skills

call opening: January 2026

Admission requirements

- Application has to be submitted following the link: <https://www.emmcchir.org>
 - Requirements:
 - - B2 level of English language
 - - Bachelor Degree in one of the classes:
 - **Degree in Chemical sciences and technologies**, Sciences and technologies for the environment and nature, Pharmaceutical sciences and technologies, Civil and environmental engineering, Industrial Engineering, Biological Sciences, Industrial engineering
 - Any other Degree obtained in another country in the same area will be evaluated and recognized valid by the Council of the Master's Degree.
- It is also necessary:
- To have acquired at least **60 credits in basic scientific disciplines**, of which at least **25 credits in the following scientific sectors: chemistry, biology, industrial engineering** (CHIM / 01-CHIM / 12; BIO / BIO-10/11; ING-IND / 22 ING-IND / 27)
 - The evaluation of candidates is made by a Selection Committee composed of representatives from each of the partner universities in the ChIRS. Admission is only possible for excellent candidates who reach a minimum score of 3.5 in 5.0 in the evaluation of each of five parameters: **Academic excellence; Language proficiency; Motivation; Suitability and References**



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