



# UNIVERSITÀ DEGLI STUDI DI PALERMO

**Department: Engineering**

**A.Y. 2019/2020**

## **DEGREE COURSE IN CHEMICAL AND BIOCHEMICAL ENGINEERING**

### **Characteristics**



Class of Bachelor's Degree  
(BSc) on Industrial  
engineering (L-9)



3 YEARS



PALERMO



FREE ACCESS



2211

### **Educational objectives**

The 1st cycle Degree Course in Chemical and Biochemical Engineering aims at training technicians able to face in a group context problems in the chemical-physical, biochemical or biotechnological fields integrating competences in three fundamental sciences (Physics, Chemistry and Biology) with the general ones of industrial engineering and with the specific chemical engineering one, providing students the knowledge, methods and ability to process reality which facilitate their access in the labour market.

To achieve these training objectives, basic sciences including Physics, Chemistry and Mathematics are studied. The educational objective is to illustrate to the students the laws underlying chemical-physical phenomena, highlighting as much as possible their technical-practical implications and providing the elements of language and mathematical formalism enabling the translation of the studied contents in quantitative terms.

With this objective the first half of the educational programme consists of teachings related to Calculus and Geometry, Physics, Chemistry and Organic Chemistry.

To further enhance the ability to deal with chemical-physical and biochemical problems of its graduates, the Degree Course integrates the aforementioned basic contents, with teachings belonging to biology, namely biochemistry and microbiology that complete the education of students in basic sciences by offering them the knowledge of the main rules underlying the functioning of living systems.

The above described contents are integrated by typical Chemical Engineering teachings starting from the second course year (Thermodynamics of Chemical and Biochemical Processes, Transport Phenomena, Chemical and Biochemical Plants, Principles of Chemistry and Industrial Biochemistry), providing also useful knowledge in the design and management of biotechnological and biochemical processes, thanks to fact that the Course teachers focus their research activities on biotechnological fields.

This knowledge is integrated with the typical disciplines of Industrial Engineering such as Construction Theory and Electrical Engineering.

From this synergy, integrated with elective modules in which it is possible to study more specific contents of chemical and biochemical engineering, further opportunities arise to deepen and use the concepts, simultaneously integrating all the reality scales of from the molecular to macro ones, to fit in profitably into the management of a group not necessarily limited to the design, optimization and management of chemical-physical processes.

Furthermore, in the area of equipment design and the study of chemical and biochemical processes, economic, safety, environmental sustainability and professional ethics are also considered. These problems are further developed with seminar activities given as part of the "other training activities".

For the final test a limited commitment is required corresponding to 3 CFU which consists of an interview. The topic of discussion of the interview is chosen by the student from a list of topics prepared by the course of studies with its own resolution and published at the beginning of A.A. on the website of the course itself.

### **Professional opportunities**

Legenda: Per. = periodo o semestre, Val. = Valutazione (V=voto, G=giudizio), TAF= Tipologia Attività Formativa (A=base, B=caratterizzante, C=Affine, S=stages, D=a scelta, F=altre)

## Profile:

Junior Chemical and Biochemical Engineer

## Functions:

The Junior Chemical and Biochemical Engineer trained in the three-year degree is a professional who works in various industrial sectors in the operational management of plants, systems, processes or services based on the use of chemical-physical, biochemical and microbiological transformations in a context of sustainability environmental, economic and safety. The relevant industrial sectors are the chemical, oil, energy, biotechnology and biochemical, pharmaceutical, agri-food, materials sectors, often characterized by the presence of large industrial groups operating internationally.

Only for some types of freelance activities, graduates may be required to pass the national qualification exam to register in the specific section of the Board of engineers.

Among the main activities carried out by the chemical engineer and junior biochemist it is worth mentioning the following:

- participation in the management of production and transformation processes based on the use of chemical, biochemical and microbiological technologies;
- collaboration in the management and operation of industrial plants for chemical, biotechnological, biochemical, food and pharmaceutical industries, for the production, distribution and use of fuels and biofuels, of energy and for the treatment of waste water and waste;
- participation in the management and operation of plants for the depollution, for the treatment of fumes and emissions from combustion processes, for waste disposal, for water purification and for the remediation of polluted soils with chemical-physical, biochemical and microbiological technologies.

It is worth pointing out that better and more important opportunities for professional growth and expansion of skills, specialization, and management of high professional responsibilities in all sectors of the processing and transformation industry previously listed can only be achieved by integrating training through the achievement of a 2nd cycle degree, or anyway through further training activities such as professional 1st level university master courses.

A high capacity for autonomous management of complex problems will be achieved with the attendance of a PhD course and the achievement of the relevant academic qualification.

## Skills:

The main competences of the chemical engineer and junior are:

- knowledge of the theoretical, logical and formal aspects of mathematics and of the three basic sciences, chemistry, physics and biology, aimed at the interpretation and mathematical description of the chemical-physical, biochemical and microbiological transformations involved in the technological and biotechnological processes of engineering ;
- knowledge of the general principles of structural mechanics and electrical engineering;
- in-depth knowledge of the subject areas of thermodynamics, fluid dynamics, heat and matter transport phenomena, and unit operations;
- knowledge of industrial processes and productions in both traditional (chemical, petrochemical, oil & gas) and innovative sectors (biotechnologies, materials, water purification, soil and air)
- ability to work profitably in a group to identify, formulate and solve complex problems of the relevant disciplinary field;
- ability to participate in the management of complex and/or innovative systems, processes and services;
- ability to organize independent learning of related or related problems in the field of chemical and biochemical engineering
- communication skills in the specific professional field
- application and context knowledge.

## Professional opportunities:

Among the main professional outlets of the three-year chemical and biochemical engineers we can list:

- Oil and petrochemical companies
- Bio-refineries
- Chemical and agro-food companies
- Electronic companies
- Energy companies
- Companies for the production of materials
- Biotechnology and pharmaceutical companies
- Industrial and research laboratories.

## Final examination features

To obtain the degree, students must have acquired 180 credits including those relating to the final examination, in accordance with the Course Regulations. The final test has the objective of assessing the level of maturity and critical skills of the undergraduate, with respect to learning and to the acquired knowledge, on completion of the activities provided by the course syllabus. The final examination consists of an oral test, in accordance with the rules fixed every year by the final examination Regulations, respecting and consistent to the academic schedule, the ministerial requirements and to the relevant Guidelines of the University.

Subjects 1 ° year	CFU	Sem.	Val.	SSD	TAF
01788 - CHEMISTRY <i>Dispensa(PO)</i>	9	1	V	CHIM/07	A
03675 - GEOMETRY <i>Falcone(PA)</i>	6	1	V	MAT/03	A

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Subjects 1 ° year	CFU	Sem.	Val.	SSD	TAF
01249 - MATHEMATICAL ANALYSIS 1 <i>Firmani(PC)</i>	9	1	V	MAT/05	A
04677 - ENGLISH LANGUAGE	3	1	G		E
02605 - COMPUTER AIDED DESIGN <i>Ingrassia(PO)</i>	9	2	V	ING-IND/15	B
01250 - MATHEMATICAL ANALYSIS 2 <i>Firmani(PC)</i>	6	2	V	MAT/05	A
15540 - PHYSICS I <i>Corso(RU)</i>	9	2	V	FIS/03	A
Stage and others	3				F
	<b>54</b>				

Subjects 2 ° year	CFU	Sem.	Val.	SSD	TAF
01933 - ORGANIC CHEMISTRY <i>Bruno(PO)</i>	9	1	V	CHIM/06	C
07870 - PHYSICS II <i>Napoli(PA)</i>	6	1	V	FIS/01	A
19578 - THERMODYNAMICS OF CHEMICAL AND BIOCHEMICAL PROCESSES <i>Inguanta(PA)</i>	12	1	V	ING-IND/23	B
08559 - BIOCHEMISTRY <i>Giuliano(PA)</i>	6	2	V	BIO/10	C
06313 - MECHANICS OF MATERIALS AND THEORY OF STRUCTURES <i>Borino(PO)</i>	9	2	V	ICAR/08	B
19577 - PRINCIPLES OF CHEMICAL AND BIOCHEMICAL ENGINEERING <i>Brucato(PO)</i>	12	2	V	ING-IND/24	B
Free subjects	6				D
	<b>60</b>				

Subjects 3 ° year	CFU	Sem.	Val.	SSD	TAF
01814 - APPLIED CHEMISTRY <i>Dintcheva(PA)</i>	9	1	V	ING-IND/22	B
19575 - CHEMICAL AND BIOCHEMICAL PLANTS <i>Scargiali(PA)</i>	12	1	V	ING-IND/25	B
02965 - ELECTRICAL DEVICES AND CIRCUITS <i>Romano(PA)</i>	9	1	V	ING-IND/31	C
05193 - MICROBIOLOGY <i>Quatrini(PA)</i>	6	2	V	BIO/19	C
19574 - PRINCIPLES OF INDUSTRIAL CHEMISTRY AND BIOCHEMISTRY <i>Scialdone(PO)</i>	12	2	V	ING-IND/27	B
05917 - FINAL EXAMINATION	3	2	V		E
Optional subjects	6				B
Stage and others II	3				F
Free subjects II	6				D
	<b>66</b>				

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## OPTIONAL SUBJECTS

<b>Stage and others</b>	<b>CFU</b>	<b>Sem.</b>	<b>Val.</b>	<b>SSD</b>	<b>TAF</b>
11034 - OTHER EDUCATIONAL ACTIVITIES - 1 CREDIT	1	2	G		F
11035 - OTHER EDUCATIONAL ACTIVITIES - 2 CREDITS	2	2	G		F
11036 - OTHER EDUCATIONAL ACTIVITIES - 3 CREDITS	3	2	G		F
<b>Stage and others II</b>	<b>CFU</b>	<b>Sem.</b>	<b>Val.</b>	<b>SSD</b>	<b>TAF</b>
11033 - INTERNSHIP 3 CREDITS	3	2	G		F
01192 - OTHER EDUCATIONAL ACTIVITIES	3	2	G		F
<b>Optional subjects</b>	<b>CFU</b>	<b>Sem.</b>	<b>Val.</b>	<b>SSD</b>	<b>TAF</b>
19576 - COMBUSTION <i>Caputo(PA)</i>	6	2	V	ING-IND/25	B
17523 - MATHEMATICAL MODELS OF CHEMICAL ENGINEERING <i>Micale(PO)</i>	6	2	V	ING-IND/26	B
17522 - MEMBRANE SEPARATION OPERATIONS <i>Cipollina(PO)</i>	6	2	V	ING-IND/26	B
10068 - TREATMENT PROCESSES OF INDUSTRIAL WASTEWATERS <i>Scialdone(PO)</i>	6	2	V	ING-IND/27	B

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