UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2021/2022
BACHELOR'S DEGREE (BSC)	CHEMICAL AND BIOCHEMICAL ENGINEERING
SUBJECT	CHEMICAL AND BIOCHEMICAL PLANTS
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50297-Ingegneria chimica
CODE	19575
SCIENTIFIC SECTOR(S)	ING-IND/25
HEAD PROFESSOR(S)	SCARGIALI FRANCESCA Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	12
INDIVIDUAL STUDY (Hrs)	192
COURSE ACTIVITY (Hrs)	108
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	3
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**SCARGIALI FRANCESCA** Tuesday 11:00 12:00 Stanza docente (309 ed. 6)

DOCENTE: Prof.ssa FRANCESCA SCARGIALI

PREREQUISITES	In order to understand the topics and. easily achieve the learning goals of the teaching course, the student must be confident with the subjects in the area of Chemical and Biochemical Ebgineering Thermodynamics and Chemical and Chemical and Biochemical Engineering Priciples.
LEARNING OUTCOMES	Knowledge and understanding ability The student, at the end of the teaching class, will possess knowledge of the main questions regarding the general structure of a Process and Bioprocess Plant and knowledge of the design procedures and operating characteristics of the main unit operations and relevant plant devices. Ability to apply knowledge and understanding The student will be able to describe and design the main topics of the subjects using the correct scientific terminology and using the suitable mathematical tools. Judging autonomy The student will be able to evaluate advantages and disadvantages of the different process industry equipment and the reliability of obtained results. Communication ability The student will acquire the capability to communicate and express problems inherent the course topics. The student will be able to highlight questions related to the unit operations studied, by proposing solutions to solve possible shortcomings and critically assessing their effectiveness. Learning ability At the end of the course, the student will have learnt how to apply transport phenomena principles and energy balances in order to solve different typologies of design problems. This will allow acquiring autonomy and awareness to be able to make supported choices when realizing potential projects.
ASSESSMENT METHODS	The evaluation will be based on two tests, which form part of the final judgment, a written test, lasting 4 hours, and an oral one. The first test goal is to determine the possession of abilities and skills required to solve assigned practical design problems; it will take into account not only the quality and accuracy of the work done, but also the approach and the methodology used and the relevant processing capabilities. The second test aims to evaluate some basic competences and problem solving capability of the student. The questions will verify: acquired knowledge; elaboration capability; talking capability; ability to build autonomous connections not bound to the referring textbooks; capability to produce autonomous evaluations inherent the course topics; capability to understand the applications connected with the discipline areas; capability to connect the discipline topics with the referring professional and technological context. The final assessment is on a 30 basis according to the criteria reported below: 30-30+: excellent knowledge of the topics, excellent language and vocabulary, good to excellent analytical capability, the student is able to apply knowledge to solve the proposed problems 27-29: Very good management of the topics, appropriate language and vocabulary, the student is able to apply knowledge to solve the proposed problems; 24-26: Good knowledge of the topics, fair language and vocabulary, limited capability to apply autonomously knowledge to solve the proposed problems; 21-23: Sufficient management of the main topics, satisfactorily language and vocabulary, poor capability to apply autonomously the acquired knowledge; 18-20: minimal basic knowledge of the main topics and of the technical language and vocabulary, poor capability to apply autonomously the acquired knowledge. The exam will be not passed if the student will show a not acceptable knowledge of the topics.
EDUCATIONAL OBJECTIVES	The main goals of this course is knowledge of design features of the main unit operations encountered in the process and bio-process industry as well as of the main fundamentals of Safety and Loss Prevention.
TEACHING METHODS	Teaching takes place in the first half of the 3rd year and is organized in frontal lectures and numerical exercises. Classroom exercises are performed to simulate the final examination.
SUGGESTED BIBLIOGRAPHY	• Perry's Chemical Engineers' Handbook - Mc Graw Hill - 8th edition - ISBN 978-0-07-142294-9 • Coulson & Richardson - "Chemical Engineering Volume 6" - Butterworth Heinemann - ISBN 0 7506 6538 6; or Towler G., Sinnot R., - “Chemical Engineering Design: Principles, Practice, and Economics of Plant Design” - Butterworth Heinemann - ISBN 978-0-08-096659-5 • Mc Cabe, Smith, Harriott - "Unit Operations of Chemical Engineering" - McGraw-Hill - ISBN 0-07-118173-3

SYLLABUS

Hrs	Frontal teaching
2	ntroduction to the course main topics. Description of main unit operations.

SYLLABUS

Hrs	Frontal teaching
2	Utilities network
14	Heat transfer equipments and theory. Basic design theory and procedure. Shell and tube heat exchangers, condensers and eboilers, plate heat exchangers, other heat transfer equipments
2	Ideal stages operations
6	Multiple stages Absorption/desorption
14	Multiple stages distillation
5	Design and Fluid dynamics of trays columns
12	Design and fluid dynamics of packed bed towers
6	Liquid-liquid extraction
2	liq-liq extraction equipments and leaching equipments
2	Flow sheet diagrams; P&I diagrams
2	Fundamentals of Safety and Loss Prevention
2	Pressure vessel deisigne; PED Code

Hrs	Practice
6	Numerical exercises on heat transfer
4	numerical exercises on multiple stages absorption
6	Numerical exercises on multiple stages distillation
10	Design of a distillation trays column
7	Design procedure odf a packed bed column
4	Numerical exercises on multiple stages liquid/liquid ans solid/liquid extraction