

Program of "ELEMENTI INTRODUTTIVI DI INGEGNERIA CHIMICA"		
"INTRODUCTION TO CHEMICAL ENGINEERING "		
NUMBER OF ECTS CREDITS: 9 (WORKLOAD IS 225 HOURS; 1 CREDIT = 25 HOURS)		
<ul style="list-style-type: none"> • I0628; compulsory • 1st cycle in Chemical Engineering, 3rd year:, 1st semester 		
Teacher: GABRIELE DI GIACOMO (Full professor of Chemical Engineering Principles)		
1	Course objectives and Learning outcomes	<p>The course has the objective of familiarize chemical engineering students of the 1st cycle with the chemical engineering activity, traditional fields of application, and basic tools, in addition to chemical engineering evolution, chemical engineering today, and chemical engineering prospective.</p> <p>Basic concepts of analysis, sources of the model equations, fundamental and constitutive equations. Simple examples of application of mass conservation: perfectly mixed tank with inlet and outlet flow rate. Dimensional consistency and dimensional analysis, least-squares fitting, and correlation. Formulation of conservation and balance equations in macroscopic form. Definition and calculation of friction factor and mass transfer coefficients using typical dimensionless groups and dimensionless correlations for simple geometries. Macroscopic balance of mechanical energy including irreversible work and applications for solving simple and typical chemical engineering problems.</p> <p>Formulation and application of mass and component balances for binary and biphasic systems. Basic concept of feed-back control, mass and component balance in membrane systems, dialysis, mass and component balances in washing and leaching systems. Psychrometry, psychrometer, and cooling of process water with air. Mass and component balance in crosscurrent and countercurrent membrane filtering and washing systems. Mass balance in laboratory ventilation.</p>
2	Course content and Learning outcomes (Dublin descriptors)	<p>The knowledge of the chemical engineering profession along with the fields of applications and of the applicable basic tools is based on the study of the following topics: a) sources of fundamental and constitutive equations for modeling chemical engineering system; b) problem formulation, and c) application of typical chemical engineering concept and tools for problem solution.</p> <p>The students will acquire:</p> <ul style="list-style-type: none"> • knowledge of the chemical engineering profession; • knowledge of the difference between fundamental and constitutive equations; • capacity to express and to use mass, component, energy and mechanical energy balance in mathematical forms as macroscopic balances; • capacity to calculate friction factor and mass transfer coefficients in binary system; • capacity to calculate friction loss and mass fluxes and rates in binary and biphasic systems; • capacity to perform mass balances in membrane system, washing or leaching systems, binary and biphasic systems, reacting system, laboratory ventilation systems. <p>On successful completion of this module, the student should:</p> <ul style="list-style-type: none"> • demonstrate capacity to work with a multidisciplinary team and to respect diversity; • be able to make autonomous choices and judgments through the discussion of the process flow-sheets and the comparison of the different adopted solutions; • capacity to assess his work and adjust the methodology.

3	Prerequisites and learning activities	The student must know the fundamentals of chemical engineering thermodynamics.
4	Teaching methods and language	Lectures, exercise, laboratory experiments, computer modelling, home work. Language: Italian or English Ref. Text books 1) Morton M. Denn, "Chemical Engineering: An Introduction." Cambridge University Press, 2012; and 2) M. C. Annesini "Fenomeni di trasporto: fondamenti e applicazioni"- Edizioni Ingegneria 2000 (Seconda edizione – 2009).
5	Assessment methods and criteria	Written and oral examination.