Program of "PRINCIPI DI INGEGNERIA CHIMICA" "CHEMICAL ENGINEERING PRINCIPLES"		
NUMBER OF ECTS CREDITS: 6 (WORKLOAD IS 150 HOURS; 1 CREDIT = 25 HOURS)		
• I2H009; compulsory **• 2nd cycle in Chemical Engineering, 1st year:, 2nd semester**		
Teacher: GABRIELE DI GIACOMO (Full professor of Chemical Engineering Principles) gabriele.digiacomo@univaq.it		
1	**Course objectives and Learning outcomes**	The course has the objective of forming chemical engineering students with the fundamental knowledge of the momentum, heat, and mass transfer in multi-phase multi-component systems. Equations of momentum, energy, and mass conservation are obtained as local and macroscopic balances. Constitutive equations (Newton, Fourier, and Fick) are used for obtaining velocity, temperature, and concentration profiles in laminar flow and different geometries. Friction factor and heat and mass transfer coefficients are defined in turbulent flow and in multi-phase and multi component systems and different geometries. Dimensionless numbers are defined and used. Heat and mass transfer coefficients at high mass transfer rates are derived by boundary-layer theory. At the end of this module the students will be able to simulate the momentum, heat and mass transfer in multi-phase and multi-component systems.
2	**Course content and Learning outcomes (Dublin descriptors)**	Conservation laws and constitutive equations; mathematical formulations and calculation; pressure drop versus flow rate; heat and mass transfer coefficients. The students will acquire • knowledge on the basic concepts of transport phenomena; • knowledge of fundamental and constitutive equations; • capacity to express the fundamental and constitutive equations as local and macroscopic balances; • capacity to predict transport properties and to calculate friction factor and heat and mass transfer coefficients; • capacity to handle simultaneous heat and mass transfer at high net mass transfer rates; • capacity to calculate heat and mass fluxes and rates in multi-component and multi-phase systems. On successful completion of this module, the student should • have profound **knowledge and understanding** of transport phenomena in multi-component and multi-phase systems; • have profound **knowledge and ability** to express such phenomena in mathematical form; • **demonstrate skills** in calculating transport properties, friction factor and heat and mass transfer coefficients; • **demonstrate skills** in solving problems on momentum, heat and mass transfer; • demonstrate **capacity** to work with a multidisciplinary team and to respect diversity; • be **able** to make autonomous choices, judgments and comparison of the different adopted solutions; • **acquire capacity** to assess the work and adjust the methodology.
3	**Prerequisites and learning activities**	The student must know the fundamentals chemical engineering thermodynamics.
4	**Teaching methods and language**	Lectures, exercise, laboratory experiments, computer modelling, home work. Language: Italian or English Ref. Text books "R. Byron Bird, Warren E. Stewart, Edwin N. Lightfoot, Transport phenomena (2nd ed.), John Wiley, 2002.
5	**Assessment methods and**	Written and oral exam

	criteria	