UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche
ACADEMIC YEAR	2016/2017
MASTER'S DEGREE (MSC)	BIOETCHNOLOGIES FOR INDUSTRY AND SCIENTIFIC RESEARCH
SUBJECT	APPLIED PHYSICAL CHEMISTRY
TYPE OF EDUCATIONAL ACTIVITY	C
AMBIT	20883-Attività formative affini o integrative
CODE	01883
SCIENTIFIC SECTOR(S)	CHIM/02
HEAD PROFESSOR(S)	LOMBARDO RENATO Ricercatore Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	102
COURSE ACTIVITY (Hrs)	48
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**LOMBARDO RENATO** Tuesday 10:00 12:00 Dipartimento STEBICEFStudio 1/B4, edificio 17, viale delle Scienze Thursday 10:00 12:00 Dipartimento STEBICEFStudio 1/B4, edificio 17, viale delle Scienze

DOCENTE: Prof. RENATO LOMBARDO

PREREQUISITES	Mathematics: concepts needed for this course are those provided in any introductory course at the undergraduate level. In particular: exponents and scientific notation, logarithms, differential differential calculus, integral calculus. Physics: concepts needed for this course are those provided in any introductory course at the undergraduate level. In particular: unit of measurements and measurement systems, extensive and intensive properties, forces, force fields, work and energy. Chemistry: concepts needed for this course are those provided in any introductory course at the undergraduate level. In particular: atomic and molecular structure of matter, method to express quantity of matter and concentration, chemical reactivity.
LEARNING OUTCOMES	Interpreting the macroscopic scale phenomena based on the dispersion, interaction and reaction on the atomic and molecular scale. Capacity to analyze the phenomena in terms of transformation, transfer and distribution of energy, and analysis of their direction based on entropy / free energy. Capacity to apply thermodynamic principles to chemical and biochemical systems in transformation with particular regard to phase and chemical equilibrium in the biological field. Knowledge of the principles that regulate the rate of the chemical transformations with emphasis on enzyme catalysis and protein folding.
ASSESSMENT METHODS	Single oral exam: only oral exam. the test consists of an interview in which the questions will be used to ensure that the student acquired the skills and knowledge provided by the course. In particular, will be 'evaluated the ability to relate the different concepts, to provide solutions to typical problems of the subject and the ability to express themselves effectively in scientific language of this field. The assessment is expressed in thirtieths. The maximum score (30/30) will be achieved when the candidate will be able to master fully and independently all these aspects in an efficient and effective way. To achieve the minimum score (18/30) he/she will demonstrate sufficient understanding of models and concepts expressed in the course and the ability to solve simple problems in a partially autonomous way.
EDUCATIONAL OBJECTIVES	To provide the cultural tools to connect the atomic-molecular vision with that at the macroscopic level and to interpret biomolecular phenomena in terms of energy by means of thermodynamic principles. To Illustrate examples of application of the typical tools of physical chemistry to issues of interest for biotechnology.
TEACHING METHODS	Class lectures
SUGGESTED BIBLIOGRAPHY	Testi di base: Atkins, P.W.; De Paula, J. Physical Chemistry for the Life Sciences, Oxford University Press, 2011 Atkins, P. W.; Paula, J. D. Chimica fisica biologica: 1; Zanichelli: Bologna, 2008. Atkins, P.W.; De Paula, J Chimica Fisica, Zanichelli, 2012 Testi di approfondimento: Kuriyan, J.; Konforti, B.; Wemmer, D. The Molecules of Life: Physical and Chemical Principles; Garland Science: New York, 2004. Cooper, A. Biophysical Chemistry, 2 edizione.; Royal Society of Chemistry: Cambridge, 2011. Sheehan, D. Physical Biochemistry: Principles And Applications, 2 edizione.; John Wiley & Sons Inc Print on: Chichester, UK ; Hoboken, NJ, 2009.

SYLLABUS

Hrs	Frontal teaching
11	Matter at the atomic scale and the intermolecular interactions: phenomena and applications
4	Energy and Thermodynamics
6	The direction of transofrmations
4	Gibbs' energy
4	Multiple components systems and phase transitions
4	Chemical equilibrium
4	Applications of thermodynamic to biological systems
4	Rate and mechanism of chemical reactions
7	Applications of kinetics to biological systems