Main course information	
Academic subject	Biochemistry with elements of molecular biology
Degree course	Natural Sciences
Degree class	L-32
ECTS credits (CFU)	6 (5.5 CFU Lectures + 0.5CFU workshop)
Compulsory attendance	Yes
Teaching language	Italian
Academic Year	2019/2020

Docente responsabile	
Name & SURNAME	Alessandra Castegna
email	alessandra.castegna@uniba.it
Tel.	0805442771
Tutorial time/day	time/day on appointment by e-mail

Course details	Pass-fail exam/Exam with mark out of 30	SSD code	Type of class
	Exam with mark out of 30	BIO/10	basic

Teaching schedule	Year	Semester
	II	I

Modalità erogazione	CFU/ECTS	Lessons (hours)	CFU/ECTS lab	Lab hours	CFU/ECTS tutorial/workshop	Tutorial/workshop hours	CFU/ECTS field trip	Field trip Hours
	5.5	44	0.5	6			-	-

Time management	Total hours	Teaching hours	Self-study hours
	150	50	100

Academic Calendar	First lesson	Final lesson
	October 2019	January 2020

Syllabus	
Course entry requirements	General chemistry
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)	
Knowledge and understanding	Through the use of didactic material, as well as of different bibliographic sources (scientific texts, scientific literature, current events), the student will be stimulated to acquire essential tools for his own training, with particular reference to the following specific objectives: • Knowledge of the main metabolic pathways and the regulation points at cellular cellular level • Knowledge of the experimental methods of biochemistry and molecular diagnostics • Knowledge of the molecular biology and the diagnostic-molecular approaches related to it Such knowledge, also useful for dissemination and educational purposes, will be acquired through theoretical lessons.
Applying knowledge and understanding	• The course aims at providing basic biochemical skills that are important for training needs of the professional figure of the Natural Sciences graduate. In detail, the following

	objectives will be envisaged: • To acquire the necessary skills to understand the metabolic interrelationships in vivo. • To interprete biochemical parameters in biological samples also in relation to physiopathological states and at different levels of structural organization, from single molecules to cells and tissues. • In relation to specific topics developed during the lesson, compare the different interpretative or summary proposals related to specific topics developed during the lesson. • Acquire the basic skills to move safely in a biochemistry laboratory and the required manual skills.
Making informed judgements and choices	The student must be able to interpret and elaborate independently the connections between the various metabolic pathways and the systems of their regulation, critically using the tools provided during the frontal lessons and the laboratory exercises. Students will be invited first individually and then collegially to discuss the case studies proposed during the lesson
Communicating knowledge and understanding	The student will have to acquire new scientific vocabulary and correct biochemical terminology in order to make clear the exposition of the concepts of all the topics covered during the course of the semester. Students will be invited to express themselves independently on concepts learned during the lessons. The acquisition of communication skills will also be facilitated by the participation of students in work groups concerning the meaning of metabolic reprogramming in a pathological context
Capacities to continue learning	The teaching will provide the student with the ability to develop an independent and continuous updating activity, through the use of texts and scientific publications, measuring himself with new information, not necessarily provided by a teacher. Through lectures and laboratory experiences, the student will be stimulated to make contact with the specific problems of biochemistry and molecular biology, in order to develop problem solving strategies. The student will be stimulated to actively participate in the learning and updating actions planned by the course of study.

Syllabus	
Course content	Biochemistry Organic chemistry concepts. General characteristics of biological macromolecules. Sugars. Lipids. Nucleotides. Amino acids. Biological membranes. Proteins: Peptide bond and peptides, properties and functions. Primary, secondary, tertiary and quaternary structure of proteins. Hemoglobin and Myoglobin. Enzymes: structure, function, classification and specificity. Elements of enzymatic kinetics. Enzymatic inhibition. Mechanism of action of enzymes. Structure and function of biological membranes. Principles of thermodynamics and principles of bioenergetics. Free energy. "High energy" compounds. Exo and endoergonic reactions. Main metabolic pathways. Electron transport chain and oxidative phosphorylation. Glycolysis. Alcoholic and lactic fermentation. Gluconeogenesis. Degradation and biosynthesis of glycogen. Pentose phosphate pathway. Krebs cycle. Lipid degradation. β-oxidation of fatty acids. Biosynthesis of fatty acids and triglycerides. Chetonic bodies. Metabolism of amino acids. Synthesis of urea. Biochemical techniques: centrifugation, spectrophotometry, chromatography, electrophoresis, enzymatic assays. Workgroups and discussion: ethanol metabolism. Inborn errors of metabolism. Molecular Biology Structure of nucleic acids: nucleotides, DNA and RNA. The role of DNA in cellular metabolism. DNA replication: Replication phases. DNA duplication in eukaryotic cells. Mechanisms of DNA repair. Transcription: RNA synthesis. The promoters. Transcription termination. RNA metabolism. The splicing mechanism. Modifications of the 5 'and 3' ends of the

	mRNA. Post-transcriptional modifications of rRNA and tRNA. The genetic code: framework of reading, codons and anticodons. Protein synthesis. Cellular components involved in the translation: ribosomes and tRNA. The stages of protein synthesis. Post-translational modifications of proteins. Regulation of gene expression. Induction and repression. Recombinant DNA technology. Basic techniques for gene cloning: restriction endonucleases, amplification vectors, PCR, Ligases. DNA sequencing. Laboratory experience: Quantification techniques of cellular metabolites through mass spectrometric analysis
Course Textbooks/Bibliography	CAMPBELL, FARRELL: BIOCHIMICA – EDISES CHAMPE, HARVEY, FERRIER: LE BASI DELLA BIOCHIMICA – ZANICHELLI
Notes	Lecture Power Points (no lecture notes) are available as support to the study.
Teaching methods	Lectures with the use of PowerPoint
Assessment methods (indicate at least the type written, oral, other)	The evaluation of the student is based on an oral interview as well as on the individual contribution and participation in lectures and classroom discussions on biochemical questions asked by the teacher.
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement there are	For the final grade the following will be taken into consideration: clarity of exposition, ownership of language, ability to link the contents of different disciplines. Also the assiduous and active participation during the course of teaching will contribute to a positive evaluation. **Knowledge and understanding** The student will have to demonstrate to know all the contents of the teaching , expecially: the main metabolic pathways and the mechanisms of their regulation; molecular biology and related diagnostic techniques. Knowledge of these topics is essential for passing the exam. **Ability to apply knowledge and understanding** The student must be able to use the evaluation criteria in the most appropriate way and correctly interpret the observations themselves; he must also demonstrate that he has understood the principles of regulation of metabolic pathways and their interrelation in a physiopathological context. These skills are essential for passing the exam. **Autonomy of judgment** In addition to the acquisition of the notions provided in the classroom and during the performance of exercises, the student will have to demonstrate, with the personal ability to provide reasoning and arguments, to be able to create simple but significant links of metabolic interrelation. **Communication skills** The ability to express concepts and formulate interpretations with language properties and clarity will be assessed very positively making use of the scientific terminology learned during the semester. These skills, together with the previous ones, will guarantee a very positive assessment of the student's preparation and performance. **Learning ability** During the final exam, the student will have to show that he has acquired critical skills and to be able to independently acquire new knowledge in order to be able to solve or at least adequately discuss the mechanisms of metabolic interrelation even starting from the suggestions proposed in the work groups during the course of the semester

	or he himself was able to detect on the basis of the contents of the teaching. Possession of these skills will contribute to a highly positive assessment of the final exam.
Further information	