



COURSE OF STUDY Attività Motorie e Sportive

ACADEMIC YEAR 2023/2024

ACADEMIC SUBJECT *Biological Science*

General information	
Year of the course	1 year
Academic calendar (starting and ending date)	1 Term
Credits (CFU/ETCS):	10 CFU di cui 5 BIO/13 5 BIO/10
SSD	BIO/13 – BIO/10
Language	Italian
Mode of attendance	Not Mandatory

Professor/ Lecturer	
Name and Surname	Nicola Marrano
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Department and address	Policlinico di Bari. Padiglione Morgagni, 3° Piano, Endocrinologia
Virtual room	TEAMS (codice da creare all'occorrenza)
Office Hours (and modalities: e.g., by appointment, on line, etc.)	Friday, ore 15:00, Policlinico di Bari, Palazzo Morgagni III piano, Endocrinologia, By appointment to be taken by email
Professor/ Lecturer	
Name and Surname	Luigi Nicassio
E-mail	luiginicassio@yahoo.it luigi.nicassio@uniba.it
Telephone	3497757030
Department and address	By appointment to be taken by email
Virtual room	TEAMS (codice da creare all'occorrenza)
Office Hours (and modalities: e.g., by appointment, on line, etc.)	By appointment to be taken by email

Work schedule			
Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
250	80		170
CFU/ETCS			
10	8		2



Learning Objectives	The course of Biological Sciences aims to introduce the student to the basic concepts of cell biology, genetics and biochemistry (the organisation and functioning of cells as fundamental units of the organisation of living matter, the biological structures and molecules that make up cells, the mechanisms underlying the energy metabolism of the cell, principles governing the diversification of biological units, fundamental mechanisms governing the transmission of hereditary characteristics, dynamic character of living matter as a result of the interactions between biological units and the environment) and to understand how these aspects can be useful in the field of motor and sports activities.
Course prerequisites	No

Teaching strategie	Lectures
Expected learning outcomes in terms of	
Knowledge and understanding on:	At the end of the course the student must demonstrate that he has acquired knowledge and understanding: of the cell as a fundamental unit of organization of living matter and the biological structures that make it up; the main biological molecules that make up the cell, their organization and their functioning; the mechanisms underlying the energy metabolism of the cell; the principles governing the diversification of biological units; the fundamental mechanisms governing the transmission of hereditary characteristics; the dynamic character of living matter as a result of the interactions between biological units and the environment.
Applying knowledge and understanding on:	At the end of the course, the student must demonstrate that he has acquired knowledge and ability to understand applied: apply the knowledge learned to the activities carried out in the field of sports and sports sciences.
Soft skills	Critical and judgmental skills: identify the central aspects of applied biology, genetics and biochemistry underlying the mechanisms that regulate the physiological and pathological effects of physical activity. Communication skills: acquire communication skills to clearly and effectively transfer ideas, information, data and methodologies, both in written and oral form, related to applied biology, genetics and biochemistry in the field of motor and sports sciences. Ability to learn: acquire sufficient learning skills and deepening of research topics related to applied biology, genetics and biochemistry through the consultation of bibliographic material in paper and electronic form.
Syllabus	
Content knowledge	<p>APPLIED BIOLOGY AND GENETICS</p> <ol style="list-style-type: none"> 1. Introduction to the cell as a fundamental unit of living matter. 2. The main biological molecules: carbohydrates, nucleic acids, proteins and lipids. 3. Structure and function of membranes. 4. The endomembrane system and membrane traffic. 5. The cytoskeleton and cellular architecture. 6. Cell surface, extracellular matrix, cellular junction. 7. Nucleus and DNA replication. 8. Protein synthesis and sorting. 9. Cellular metabolism and energy storage; structure, localization and function of mitochondria. 10. Cellular communication and signal transduction: surface receptors and receptor response mechanisms, growth factors, endocrine and paracrine hormone systems. 11. Control of gene expression. 12. Birth, cycle and cell death. 13. Staminality and differentiation. 14. Concept of gene and allele.



	<p>15. Mode of transmission of inherited characters. 16. Asexual and sexual reproduction. 17. Gene mutations: biological causes and effects.</p> <p>BIOCHEMISTRY</p> <p>1. Inorganic chemistry: matter; atom; electrons; periodic table; electronic configuration; valence; electronegativity, ionization energy; electronic affinity. isotopes chemical bonds; concentration; acids, bases, salts: pH; redox reactions. 2. Organic chemistry: carbon; isomers; alkanes, alkenes, alkynes; alcohols; aldehydes and ketones; amines; carboxylic acids; esters; amines; amides. 3. Proteins: amino acids; primary, secondary, tertiary, quaternary structure; protein functions; hemoglobin and myoglobin. 4. Enzymes: chemical and enzymatic reactions; free energy and activation; enzymatic kinetics; Michaelis and Menten model; Lineweaver-Burke equation; double substrate reactions; enzymatic inhibition; enzymatic regulation. 5. Metabolism: energy balance; catabolic and anabolic pathways; metabolic regulation; metabolic subdivision; ATP; electron transporters; insulin and glucagon. 6. Carbohydrate metabolism: classification; digestion and absorption; glucose transport; glycolysis and regulation; destinies of pyruvate; galactose and fructose metabolism; glycogen, glycogenosynthesis and glycogenolysis; gluconeogenesis. 7. Lipid metabolism: classification; digestion and absorption; fatty acids and metabolism; betaoxidation and regulation; fate of glycerol; ketone bodies; fatty acid biosynthesis and regulation. 8. Mitochondria and cellular respiration: mitochondrial biogenesis; Krebs cycle and regulation; anaplerotic reactions; electron transport chain; oxidative phosphorylation; thermogenesis; free radicals; antioxidant defenses. 9. Amino acid metabolism: protein digestion and absorption; catabolism; transamination reactions; alanine pathway; glutamine pathway; nitrogen balance; urea cycle; glucogenic and ketogenic amino acids; branched-chain amino acids. 10. Skeletal and cardiac muscle: structure and types of muscle cells, sarcomeres, mechanism of contraction and regulation, muscle metabolism.</p>
Texts and readings	<ul style="list-style-type: none"> • <i>Fondamenti di Biologia e Genetica. di Pierantoni, Cobelli, Meccariello, Chianese. EdiSES Edizioni.</i> • <i>Le Basi delle Biochimica. Emine Ercikan Abali, Susan D. Cline, David S. Franklin, Susan Viselli. Zanichelli</i> • <i>Biochimica. Molecole e metabolismo (Mathews) Ed. Pearson.</i>
Notes, additional materials	<ul style="list-style-type: none"> • <i>Handouts provided by teachers.</i>
Repository	<ul style="list-style-type: none"> • <i>The teaching material is provided directly by the teachers during the lessons and is also available upon request of the students.</i>

Assessment	
Assessment methods	<p><i>Oral examination</i></p> <p><i>Upon agreement with the students, in extraordinary cases, there will be the possibility of providing a written test with multiple choice quiz. In this case, the marks will be communicated by email to the student representative.</i></p> <p><i>The exam will be considered passed if the student has achieved a sufficient level in both Applied Biology and Genetics and Biochemistry. In the event that the student achieves the sufficiency only in one of the two subjects, he can retain the mark of the subject passed within the current academic year.</i></p>



<p>Assessment criteria</p>	<ul style="list-style-type: none"> • <i>Knowledge and understanding:</i> or: the student is expected to be able to clearly explain the fundamental notions of applied biology, biology and biochemistry. • <i>Knowledge and understanding applied:</i> or the student is expected to be able to apply critically the knowledge acquired to practical activities related to their profession. • <i>Autonomy of judgment:</i> The student is expected to be able to identify the central aspects of applied biology, genetics and biochemistry underlying the mechanisms that regulate the physiological and pathological effects of physical activity. • <i>Communication skills:</i> the student is expected to express himself using the technical terms of the subject. • <i>Ability to learn:</i> it is expected that the student will be able to acquire sufficient learning skills and deepening of research topics related to applied biology, genetics and biochemistry, through the consultation of bibliographic material in paper and electronic form.
<p>Final exam and grading criteria</p>	<p>The student must demonstrate knowledge of the topics under study and have understood the issues related to them, as well as to have reached a level of knowledge to develop independently interpretative arguments</p> <ol style="list-style-type: none"> 1) Failure to pass the test: insufficient knowledge of the course contents, insufficient evaluation and reasoning skills, lack of basic knowledge. 2) 18 to 21: sufficient or barely sufficient preparation; minimum knowledge of the institutions and of the problems tackled during the course; presence of minor gaps; 3) 22 to 24: average preparation characterized by no particular deepening and by gaps that can be filled in the continuation of the overall training; 4) 25 to 27: generally good preparation even if not particularly thorough; technical language and adequate expressive ability; 5) 28 to 30: excellent or excellent preparation; precise and precise technical language and expressive ability; 6) 30 e lode: preparation, technical language, expressive and argumentative skills of the highest level
<p>Further information</p>	