University of Naples d "Parthenope"
Master Degree in "Sciences of movement for prevention and well-being" (LM-67)
Program of the Biochemistry and Bioenergetics of Physical Exercise course (6 CFU)
A.A. 2023-2024 – I year I semester
Odd group: Prof.ssa Rosaria Arcone
Even group: Prof. Mariorosario Masullo

Flow of energy in living organisms: principles of bioenergetic and thermodynamic relations. ATP and energy-rich compounds. Structure of skeletal muscle tissue. Energy substrates of skeletal muscle.
General concepts of metabolism: anabolic, catabolic and amphibolic pathways.
Skeletal muscle metabolism: classification of muscle fibers and biochemistry of contraction. Skeletal muscle bioenergetics: energy sources and mechanisms of ATP synthesis.
Anaerobic-alactacid mechanisms: phosphocreatine and myokinase.
Anaerobic-lactacid mechanisms: glycolysis and fate of pyruvate. Lactic fermentation. Monocarboxylate transporters (MCT). Utilization of the lactate. Cori cycle. Methods of measurement of blood lactate. Oxygen debt.
Glycogen: structure, function and metabolism. Role of muscle glycogen in function of physical activity and energy balance.
Aerobic mechanisms: the pyruvate dehydrogenase complex and its regulation. Krebs cycle and energy balance. Triglycerides and adipose tissue. Mobilization and delivery of fatty acids. Activation of fatty acids and the carnitine mitochondrial transport system. Beta-oxidation of fatty acids and energy balance. Outline of amino acid oxidation: transaminases and urea production. Mitochondria, membrane transporters and shuttle systems.
Oxidative phosphorylation: reactions, electron transport chain and ATP synthesis. Mechanism of ATP synthesis and ATP synthase complex (FOF1). Energy balance. Uncoupling proteins and agents. Reactive oxygen species (ROS) and health. Physical activity and ROS production.

Reading and commentary of scientific articles on applied aspects of Bioenergetics in Sport Sciences.

NELSON D.L., COX M.M., "Lehninger Principles of Biochemistry", Macmillan Education Eds.
MOUGIOS V., "Exercise Biochemistry", Human Kinetics Eds.
MORAN L.A., HORTON R.A., SCRIMGEOUR G., PERRY M.D., "Principles of Biochemistry, 5/E", Pearson Education Eds.