



MODELLO SCHEDA INSEGNAMENTO

Corso di L	Scienze Biologiche
Denominazione insegnamento:	Fisiologia Generale
Numero di Crediti:	9 (72 ore)
Semestre:	II anno II semestre
Docente Titolare:	Elena Silvestri
Dottorandi/assegnisti di ricerca che svolgono attività didattica a supporto del corso:	
Orario di ricevimento:	Mercoledì ore 15:00-17:00; Venerdì ore 15:00-17:00
Indirizzo	silvestri@unisannio.it

PRESENTAZIONE DEL CORSO:

The course covers the following contents:

Elements of cellular physiology. Membrane transport and ion channels; Ionic homeostasis; The origin of Bioelectric phenomena, electric excitability and excitation transmission. Cell communication: chemical and electrical signals. Mode of coding information in the nervous system. Principles of sensory physiology. Muscles and other effectors. Integrated physiology. The main apparatus: circulatory, respiratory, nervous, digestive, excretory, endocrine. The course provides basic and transverse knowledge to other biological disciplines. Understanding the contents of this course is certainly a facilitating factor in studying other disciplines provided by the degree course.

GLI OBIETTIVI FORMATIVI

The didactic setting of the course provides the following cultural skills:

Physiological Fundamentals of Cellular Processes

- integrated functions in cell metabolism

- relationship between the Organism and the Environment - homeostatic mechanisms

And the following methodological skills:

- apply quantitative relationships to the analysis of physiological processes
- appreciate the scale relationships between the various levels of organization of living matter

PREREQUISITI RICHIESTI

Former knowledge required: Physics and mathematics, inorganic and organic chemistry; biochemistry, cell biology, anatomy.

FREQUENZA DELLE LEZIONI

Although not mandatory according to the University Teaching Document, frequency is recommended. The student can benefit from the presentation of the arguments interpreted and linked by the lecturer in the classroom as well as by the participation in tests and virtual laboratories.

CONTENUTI DEL CORSO

Introduction to thermodynamics: First and second principles of the thermodynamics. Enthalpy and Entropy. Thermodynamics and bioenergetics. Integrated systems and Steady states. Cellular membrane: organization and functions. Cellular communication: extra and intracellular messengers. Ionic equilibria and membrane potentials : transports in homogenous liquid phase. Spread. Water, Osmosis and Regulation of the cellular volume. Active transports: sodium-potassium pumps. Rest membrane Potential. Passive properties of the cellular membrane. Excitability. Theory of the linear cable. Local answer. Excitation threshold. Ionic bases of the action potential. Activation and inattivazione of the ionic channels. Absolute and relative refractory period. Conduction of an impulse in a mielinic fiber. Molecular mechanisms in the control of ionic channels. Sensory receptors. Central Synapses: EPSP and IPSP. Presynaptic and postsynaptic inhibition. Physiology of the muscular cells: Morfo-functional organization of the striated and smooth muscles. Electromechanical connection. Theory of the sliding of filaments and cycle of the cross-sectional bridges: role of calcium and ATP. Cardio-vascular functions: Heart: excitability (pacemaker activity , cardiac automatism and system of conduction). Renal

functions: Processes of urine formation; glomerular filtration and tubular resorption and secretion. Renal 'clearance'.

METODI DIDATTICI

Frontal lessons, virtual laboratories, tests.

TESTI DI RIFERIMENTO

- Fisiologia e biofisica delle cellule. Taglietti Casella, EdiSES 2015
- Principi di fisiologia e biofisica della cellula. Taglietti Casella, La Goliardica Pavese, Vol. I, II, III, e IV
- Filologia, Autori vari, Poletto Editore
- Fisiologia: dalle molecole ai sistemi integrati, di Emilio Carbone, Federico Cicirata, Giorgio Aicardi

ESAME DI PROFITTO

Oral exam

CALENDARIO ESAMI

Rinvio al link

PRENOTAZIONE ESAMI

Rinvio al link

SYLLABUS

MODELLO SYLLABUS

Argomenti	Ore	Riferimenti bibliografici	Tipologia di lezione
Homeostasis	2	Recommended bibliography	Frontal lessons
Plasma membrane	4	Recommended bibliography	Frontal lessons
Trans-membrane transport	10	Recommended bibliography	Frontal lessons
Membrane potentials	6	Recommended bibliography	Frontal lessons, virtual laboratories
Electrophysiology	8	Recommended bibliography	Frontal lessons
Action potential	10	Recommended bibliography	Frontal lessons,

			virtual laboratory
Cell communication	10	Recommended bibliography	Frontal lessons
The nervous system	4	Recommended bibliography	Frontal lessons
Muscle contraction	4	Recommended bibliography	Frontal lessons, virtual laboratories
Sensory receptors	6	Recommended bibliography	Frontal lessons
Cardiac muscle	2	Recommended bibliography	Frontal lessons
Cardiocirculatory apparatus	2	Recommended bibliography	Frontal lessons
Kidney functions	2	Recommended bibliography	Frontal lessons
Respiratory system	2	Recommended bibliography	Frontal lessons
Gastric apparatus	2	Recommended bibliography	Frontal lessons