

INTEGRATED ORGAN PHYSIOLOGY

16:963:512

Course Directors:

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Course Instructors:

Dr. Phoebe Stapleton	Dr. Andrew Gow
Dr. Grace Guo	Dr. Lauren Aleksunes
Dr. Raymond Rancourt	Dr. Troy Roepke
Dr. Carol Gardner	Dr. Marion Gordon

Course Objectives:

The purpose of this course is to provide the learner with a basic understanding of anatomy, physiology, and applied biochemistry and its application to toxicology. Students will be introduced to the structure (anatomy) and function (physiology) of the major body systems emphasizing cellular biology, neural, cardiovascular, respiratory, renal, hepatic, immune, endocrine, and metabolic systems, culminating to systems integration. This course will give a thorough background of physiology to support future biomedical, pharmacological, and toxicological sciences coursework.

LECTURE SCHEDULE

Topics	Instructors
Cellular Biology – Introduction, Molecular Interactions <ul style="list-style-type: none"> • Overview, Chemistry Review, Acids/Bases, Biomolecules – Carbohydrates, Lipids, Proteins, Nucleotides 	Stapleton/Gow
Cellular Biology – Compartmentation: Cells and Tissues <ul style="list-style-type: none"> • Biological Membrane, Intracellular Compartments, Tissues 	
Cellular Biology – Energy and Cellular Metabolism <ul style="list-style-type: none"> • Enzymes, ATP production, Resting Membrane Potential 	Gow
Cellular Biology – Membrane Dynamics, Communication, Homeostasis <ul style="list-style-type: none"> • Diffusion and Transport 	Stapleton
Nervous – Brain, Neurons, CNS <ul style="list-style-type: none"> • Anatomical Organization of CNS and Cells • Electrical Signaling, Cell-to-Cell Communication • Brain, Function, and Spinal Cord 	Gow
Efferent Division – Autonomic/Somatic Motor Control <ul style="list-style-type: none"> • Autonomic - Sympathetic/Parasympathetic, Motor End Plate 	Gow
Nervous –Muscles, Motor Control <ul style="list-style-type: none"> • Anatomical Components - Skeletal, Smooth, Cardiac • Fiber Types, Recruitment, Reflexes, Control of Movement 	Stapleton
Sensory Physiology – Skin <ul style="list-style-type: none"> • Relays, Dorsal Horn Loop, Skin - Anatomical Layers, Receptors 	TBD
Sensory Physiology - <ul style="list-style-type: none"> • Olfactory, Taste, Vision, Hearing, Equilibrium 	Gordon
Bones <ul style="list-style-type: none"> • Cells, Structure, and Anatomy, Calcium Balance 	Gow/Stapleton
Cardiovascular – Blood, Flow, Pressure, and Transport <ul style="list-style-type: none"> • Blood Cells – Plasma, RBC, Platelets, Proteins • Coagulation, Flow Motion and Pressure Analysis 	Stapleton
Cardiovascular – Heart <ul style="list-style-type: none"> • Anatomy, Innervation and Electrical System, Heart as a Pump, Pressure Volume 	Stapleton

Cardiovascular – Vascular Physiology and Blood Pressure <ul style="list-style-type: none"> Arteries, Capillaries, Veins, Blood Pressure, Resistance, Regulation, Exchange, Lymphatics 	Stapleton
Respiratory – Mechanisms of Breathing and Nutrient/Gas Exchange <ul style="list-style-type: none"> Anatomy, Gas Laws, Ventilation, Gas Transport and Regulation 	Rancourt
Respiratory <ul style="list-style-type: none"> Mechanisms, Hemoglobin, Gas Exchange 	Gow/Stapleton
Liver/Digestive <ul style="list-style-type: none"> Digestive Anatomy, Motility, Secretion, Regulation 	Guo
Liver/Digestive <ul style="list-style-type: none"> Digestion and Absorption, Phases of Digestion, Large Intestine 	Guo
Kidney/Urinary <ul style="list-style-type: none"> Anatomy, Filtration, Reabsorption, Excretion 	Aleksunes
Fluid and Electrolyte Balance <ul style="list-style-type: none"> Fluid Homeostasis, Sodium/Potassium Balance, Acid/Base Balance 	Aleksunes
Immune <ul style="list-style-type: none"> Anatomy and Cell Types, Innate Immunity 	Gardner
Immune <ul style="list-style-type: none"> Acquired Immunity, Inflammation 	Gardner
Endocrine System <ul style="list-style-type: none"> Hormone Classification – Protein, Steroid, Sites of Production - Anatomy Glucocorticoids, Thyroid 	Laskin
Endocrine System <ul style="list-style-type: none"> Anabolic and Growth 	Laskin
Reproduction and Development <ul style="list-style-type: none"> Sex Determination, Gametogenesis, Male Reproduction 	Roepke
Reproduction and Development <ul style="list-style-type: none"> Female Reproduction, Procreation, Pregnancy and Parturition, Growth and Aging, Hormonal/Neuronal Feedback Loops 	Roepke
Energetics – Metabolism and Integration <ul style="list-style-type: none"> Energy Balance, Temperature Balance, Glucose Balance 	Gow/Stapleton