

## Animal Physiology - Information for erasmus students

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### Professor

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The students are provided with the English version of the textbook and they are given the option to have weekly meetings with Dr. Sidiropoulou for questions and clarifications. Furthermore, they are given the option to take 6 quizzes in the first six sections (Cellular Neurophysiology, Nervous system, Muscle, Cardiovascular system, Respiratory system and Endocrine System). The students then take the final exam at the same time with the Greek students.

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### Subjects to study

1. Cellular physiology
2. Nervous system
3. Muscle
4. Cardiovascular system
5. Respiratory system
6. Endocrine system
7. Kidneys

	<b>Section</b>	<b>Chapters (Sherwood)</b>	<b>Animal Physiology (Sherwood)</b>
<b>1</b>	Cellular Physiology	3, 4	3,4
<b>2</b>	Nervous System	5, 6, 7	5, 6
<b>3</b>	Muscle	8	8
<b>4</b>	Cardiovascular system	9, 10, 11	9
<b>5</b>	Respiratory system	13	11
<b>6</b>	Endocrine system	16 (insulin and glucagon), 18, 19	7, 16
<b>7</b>	Kidneys	14	13

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## Cellular Physiology

- Membrane transport
  - Passive vs Active transport
  - Diffusion
  - Osmosis
  - Facilitated diffusion (glucose transporter and ion channels)
  - Primary active transport (sodium-potassium pump, calcium pump)
  - Secondary active transport (sodium-calcium exchanger, sodium-glucose cotransporter, sodium-hydrogen antiporter)
- Membrane potentials
  - equilibrium potential
  - resting membrane potential
    - inward rectifying channels and leak channels
  - action potential
    - ionic basis of action potential
    - voltage gated sodium and potassium channels
- Synaptic transmission
  - Electrical vs Chemical transmission
  - Neurotransmitters (which ones are they and how are they are made, i.e. enzymes used to make them)
  - Steps involved in neurotransmitter release
  - Types of neurotransmitter receptors
  - acetylcholine receptors (nicotinic and muscarinic)
  - adrenergic receptors (alpha1, alpha2 and beta)

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## Nervous system

- Organization and cells of the nervous system
- Protection and nourishment of the brain
- Cerebral cortex
- Cerebellum
- Brain stem
- Spinal cord
- Receptor physiology
- Eye: vision
- Ear: Hearing and equilibrium
- Chemical senses: Taste and smell

- Autonomic nervous system
  - Somatic nervous system
  - Neuromuscular junction
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## Muscle

- Skeletal muscle
    - neuromuscular synapses/motor units
    - structure (sarcomere, proteins-actin, myosin, Zdiscs, )
    - contraction (ATP, calcium)
    - work generated by the contraction
    - isometric contraction
    - isotonic contraction
  - Smooth muscle
    - structure, proteins
    - contraction
    - different types of activation (receptor, depolarization, action potential)
    - the role of calcium
    - ATP
  - Differences between smooth and skeletal muscle
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## Cardiovascular system

- Anatomy of the heart
  - Electrical activity of the heart
  - The cardiac cycle
  - Cardiac output and its control
  - valves (atrio-ventricular valves, aortic valve, respiratory artery valve)
  - Blood vessels (arteries, arterioles, capillaries, veins and blood pressure)
    - Ερυθρά αιμοσφαίρια, ερυθροποιητίνη, μεταφορά οξυγόνου
  - The blood (erythrocytes, leukocytes, platelets and clot formation)
  - What happens during exercise?
  - What happens during haemorrhage?
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## Respiratory system

- Anatomy of the lung
- Mechanics of respiration
- Gas exchange
- Gas transport
- Control of Respiration

## Endocrine function

- General principles of endocrinology
  - What is a hormone
  - What 'structures' are different hormones?
  - What receptors do different hormones bind to?
- Basic info about metabolism (carbohydrates, proteins, lipids)
- Pancreatic hormones (insulin and glucagon)
  - How is insulin released
- Hypothalamus and pituitary
- Growth hormone
- Adrenal glands
- Thyroid gland
- Stress response
- Male reproductive physiology
- Female reproductive physiology

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## Kidneys

- Kidney anatomy
- Glomerular filtration
- Tubular reabsorption
- Tubular secretion