



The Goodman  
Faculty of Life Sciences  
Bar-Ilan University

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## Physiology of Human Systems 80214

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Academic year: 2021-2022 Semester: B Hours/credits: 2h/ 1 credits

**Mandatory** / elective (mark the relevant)

**Prerequisites:** Course "Introduction to physiology of the living" 80-206, or any other course that covers in detail the principles of synaptic transmission and generation of action potentials in the nervous system.

**Year in program & how often given:** 2<sup>nd</sup> year undergraduate programs, given yearly

**Course Overview – Short abstract:** To understand in depth, the anatomy of the various tissues and organs that make up the entire body. To understand how the aforementioned systems of the body function from a physiological perspective by learning about the chemical, cellular, and systemic physiology of the human body. The course covers the anatomy and physiology of the cardiovascular and respiratory systems, in normal and pathophysiological states. This course provides several aspects associated with the digestive and excretory systems, which are somewhat relevant to the aforementioned systems. The digestive and excretory systems will be taught separately, in elective course 80345-01.

**Assessment: Coursework and Grade structure** Multiple choice exam which serves as 100% of the final grade of the course.

## Week-by-Week content, assignments and reading

Part #	Subject
1	<p><b>Introduction to the course:</b></p> <ol style="list-style-type: none"> <li>1. Definition of the subject – anatomy and physiology.</li> <li>2. Organization levels of the human body.</li> <li>3. Homeostasis (equilibrium of the internal environment of the body) and its regulation by feedback mechanisms.</li> <li>4. The regulatory systems of the body – (a) the somatic nervous system, the autonomic nervous system and its division to the sympathetic and parasympathetic nervous systems; (b) the hormonal regulatory system in the body.</li> <li>5. External secretory glands; internal secretory glands – endocrine secretory glands; organs with endocrine cells; hormones and neurohormones.</li> </ol>
2	<p><b>The cardiovascular system – composition of the blood, the heart:</b></p> <ol style="list-style-type: none"> <li>1. The cellular components of the blood; the composition of the blood plasma; the functions performed by the blood's cellular components and the solutes of the blood plasma.</li> <li>2. The anatomical structure of the heart and the structure of the heart tissue: structure of the heart wall; structure of the heart atria and ventricles and the septa that separate them; structure of the heart valves and the mechanism by which they open and close.</li> <li>3. Blood flow to- and from the heart: the pulmonary circulation, the systemic circulation and the coronary circulation in human adults; anatomical characteristics of the fetal heart and blood circulation in the human fetus.</li> <li>4. Blood clots in coronary arteries as a result of fatty sediments and their impact on pathology of the heart.</li> <li>5. Structure of the cardiac muscle at the molecular and cellular levels.</li> <li>6. The electrical conduction system and its function: characteristics of conduction and the generation/propagation of action potentials in the sinoatrial (SA) node, the wall of the atria, the atrioventricular (AV) node, along the bundle of His and</li> </ol>

	<p>the septum between the ventricles, along the Purkinje fibers and the walls of the ventricles.</p> <p>7. Pathologies caused by abnormal rhythmic changes: cardiac arrhythmias.</p>
3	<p><b>The cardiovascular system – blood vessels:</b></p> <ol style="list-style-type: none"> <li>1. Anatomy of the blood vessels.</li> <li>2. Factors affecting blood flow.</li> <li>3. Regulation of blood pressure.</li> <li>4. Regulation of blood flow.</li> </ol>
4	<p><b>The cardiovascular system – regulation of the whole-system activity:</b></p> <ol style="list-style-type: none"> <li>1. The cardiovascular (CV) center in the brain stem: input to- and output from.</li> <li>2. Regulation of blood pressure by the nervous system; the baroreceptor reflex and the chemoreceptor reflex.</li> <li>3. Blood pressure regulation by hormones.</li> <li>4. Blood pressure self-regulation by the tissues.</li> </ol>
5	<p><b>The respiratory system:</b></p> <ol style="list-style-type: none"> <li>1. Anatomy of the respiratory system.</li> <li>2. Association between blood perfusion and lung ventilation.</li> <li>3. Cellular respiration, external respiration, and internal respiration.</li> <li>4. Gas transport and exchange in the body, and the various parameters that affect them.</li> <li>5. Breathing mechanics: respiration muscles; respiration at rest; respiration under exertion; the parameters that impact inspiration and expiration; resistance of the airways; lung volumes and lung capacities.</li> </ol>
6	<p><b>Regulation of the respiratory system by the nervous system:</b></p> <ol style="list-style-type: none"> <li>1. The respiratory center in the brain stem.</li> <li>2. Regulation of the respiratory muscle activity by the nervous system at rest and during exertion.</li> <li>3. Regulation of the respiratory rate by the nervous system based on the blood gas composition; hypoventilation and hypercapnia; hyperventilation and hypocapnia; types of hypoxia.</li> <li>4. Regulation of the respiratory rate by the nervous system based on external stimuli.</li> </ol>

**Required text:**

Tortora, G.J. & Grabowski, S.R. Principles of Anatomy & Physiology, 10<sup>th</sup> Edition, 2003. John Wiley & Sons, Inc., USA

Chapters: (part of 19), 20, 21, 23, 24, (part of 25), 26.

or the equivalent chapters in:

Tortora, G.J. & Derrickson, B., Principles of Anatomy & Physiology, 15<sup>th</sup> Edition, 2017. John Wiley & Sons, Inc., USA.