

<b>Course title</b>	<b>Basic Physiology and Pharmacology</b>				
<b>Course code</b>	<b>GEMD-104</b>				
<b>Course type</b>	Required				
<b>Level</b>	Undergraduate				
<b>Year / Semester</b>	Year 1, Semester 2				
<b>Teacher's name</b>	<b>Dr Katerina Prokopiou</b>				
<b>ECTS</b>	13	<b>Teaching Periods per Week</b>			
		<b>Large Group Learning</b>	<b>Small Group Learning</b>	<b>Laboratories &amp; Skills</b>	<b>Clinical Practice</b>
		2-3	4	1	1
<b>Course purpose and objectives</b>	<p>The aim of this course is to:</p> <ul style="list-style-type: none"> <li>• Introduce students to basic physiology and the concept of homeostasis.</li> <li>• Understand the fundamental mechanisms underlying normal function of cells, tissues, organs, and organ systems of the human body.</li> <li>• Provide a detailed understanding on membrane, nerve, and muscle physiology, which is fundamental for the understanding of the other organ systems.</li> <li>• Introduce students to the basic principles of pharmacology (pharmacodynamics vs pharmacokinetics).</li> <li>• Describe the principles of pharmacodynamics and understand the significance of the effect of drugs on the human body.</li> <li>• Describe the principles of pharmacokinetics and understand the significance of the effects of the human body on drugs.</li> <li>• Introduce students drug dosage calculations.</li> <li>• Familiarize students to some basic clinical skills and communication skills.</li> <li>• Introduce to students the common drugs used in the autonomic and central nervous system.</li> <li>• Outline the principles of drug interaction, drug dependence.</li> <li>• Describe the mode of action and side effects of anti-inflammatory drugs and analgesics.</li> <li>• Appreciate the effect of polypharmacy and the outcome of adverse drug reactions.</li> </ul>				

<b>Learning outcomes</b>	<p>At the end of the course the student will be able to:</p> <p><b>Knowledge</b></p> <p><b><u>Introduction to Basic Physiology</u></b></p> <ol style="list-style-type: none"> <li>1. Describe a eukaryotic cell, its cell membrane and the different organelles and account for cells' overall function.</li> <li>2. Understand the levels of cellular organization and outline the body's organ systems.</li> <li>3. Describe the different channel and receptor types and their effector systems (including secondary messengers) at the molecular level, including the different types of intercellular messengers.</li> <li>4. Discuss how channels and receptors can be targets for drugs.</li> <li>5. Describe the various body fluid compartments and their ionic composition (intracellular, extracellular – interstitial/plasma).</li> <li>6. Revise the terms osmolarity, osmolality and tonicity.</li> <li>7. Explain the concept of homeostasis and outline major mechanisms contributing to body fluid homeostasis.</li> <li>8. Understand how physiological adaptation occurs during extreme conditions (e.g. environmental changes and acute infection).</li> <li>9. Describe the transport of substances across cell membranes (passive diffusion and active transport) and the concept of osmosis.</li> <li>10. Outline neuronal resting membrane potentials and the action potential generation and propagation.</li> <li>11. Describe the organization and structure (pre- and post-synaptic neurons) of the peripheral nervous system, its functions, receptors and neurotransmitters involved.</li> <li>12. Describe the organization and structure (pre- and post-synaptic neurons) of the central nervous system (brain and spinal cord), its functions, receptors and neurotransmitters involved.</li> <li>13. Describe the principles of skeletal and smooth muscle excitation and contraction (the E-C coupling) and the sliding filament theory.</li> <li>14. Describe the nervous and hormonal control of skeletal and smooth muscle contraction, including motor units.</li> <li>15. Compare and describe the differences between the skeletal muscle, smooth muscle, and cardiac muscle.</li> <li>16. Outline the different types of skeletal muscles depending on their function.</li> <li>17. Discuss the types of muscle fibers and explain how physiological adaptation occurs depending on the different types of external stimulation (e.g. during exercise).</li> <li>18. Outline the physiological changes that occur with aging and list some of the most common conditions that arise in the elderly.</li> </ol>
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### **Introduction to Basic Pharmacology**

19. Explain the stages of drug discovery and development, including the four types of clinical trials.
20. Discuss how channels and receptors can be targets for drugs.
21. Describe the drug - receptor interaction and effect.
22. Briefly outline the process of receptor desensitization and sensitization and provide examples of drugs that affect these processes.
23. Describe the various drug terms: agonist, antagonist, affinity, efficacy, potency.
24. Describe the four main processes of pharmacokinetics (absorption, distribution, metabolism and excretion).
25. Define the terms first-pass effect, bioavailability and volume of distribution.
26. Describe briefly the blood brain barrier and list the considerations that determine whether a drug will gain access to the central nervous system.
27. Understand the role of the liver in drug metabolism and how CYP450 inducers or CYP450 can affect overall drug metabolism.
28. Discuss the role of the kidney in drug excretion and overall drug elimination.
29. Define the terms: clearance, steady-state, zero-order and first-order kinetics and understand their clinical relevance.
30. Define the terms half-life, infusion rate, loading dose and maintenance dose and practice on calculations to determine these parameters.
31. Classify the different drug categories that work in the autonomic nervous system depending on their mode of action (cholinergic, anti-cholinergic, adrenergic, anti-adrenergic drugs).
32. Classify the different drug categories that work in the central nervous system depending on their mode of action (sedatives/hypnotic and anti-seizure drugs).
33. Describe the mode of action, indications and side effects of opioids and other analgesics.
34. Briefly discuss the principles of drug abuse, addiction, and dependence.
35. Outline the mechanism of action and uses of muscle relaxants.
36. Describe the mode of action, indications and side effects of non-steroidal anti-inflammatory drugs and paracetamol.
37. Describe the mode of action, indications and side effects of glucocorticoids.
38. Outline the types of drug interactions that can occur from multiple drug therapy.
39. Understand and recognize the different types of adverse drug reactions.
40. Appreciate how drug interactions and adverse drug reactions can be minimized through recognition and prevention of medical errors.

### ***Skills***

41. Introduction to communication skills.
42. Introduction to clinical skills: Perform and practice measurement of the vital signs: temperature, pulse, blood pressure, respiratory rate, oxygen saturation.

	<p>43. Perform urinalysis with the urine dipstick and practise interpreting the results</p> <p>44. Practise measuring blood glucose using a glucometer.</p> <p>45. Calculate the body mass index (BMI) and explain its significance.</p> <p><b>Professional competencies</b></p> <p>46. Describe the various routes of drug administration and outline the considerations for choosing an appropriate route of administration</p> <p>47. Discuss the implications of multiple drug therapy and polypharmacy in elderly patients</p> <p>48. Explain ways to avoid polypharmacy and unnecessary drug prescription.</p> <p>49. Discuss healthy lifestyle factors, including exercise, which can prevent the need for various medications in the future</p> <p>50. Discuss the role of health professionals in raising awareness and influencing public regarding drug abuse and addiction</p> <p>51. Discuss ways to prevent and treat drug dependence</p> <p>52. Recognize and predict potential adverse reactions, arising from giving two or more different medications.</p>		
<b>Prerequisites</b>	None	<b>Required</b>	None
<b>Course content</b>	<ul style="list-style-type: none"> <li>• Introduction to fluid homeostasis</li> <li>• Nerve physiology</li> <li>• Muscle physiology</li> <li>• Introduction to pharmacology and general principles of drug action</li> <li>• Drug development and clinical trials.</li> <li>• The principles of pharmacodynamics and pharmacokinetics</li> <li>• Drug routes of administration</li> <li>• Autonomic nervous system pharmacology</li> <li>• Central nervous system pharmacology</li> <li>• Drug abuse, addiction, and dependence</li> <li>• Anti-inflammatory drugs</li> <li>• Drug toxicity, drug interactions, multiple drug therapy</li> <li>• Introduction to basic clinical skills (vital signs, urinalysis, and blood glucose measurement, calculating BMI).</li> </ul>		

<p><b>Teaching methodology</b></p>	<p>Lectures</p> <p>Tutorials – two case-based learning small group sessions, one team-based learning and one journal club</p> <p>Flipped classroom activities</p> <p>Community visits</p> <p>Student centred learning/self-study</p>																																																
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<b>Assessment</b>	The course will be assessed at the end of Semester 2 with a Summative Final Examination consisting of Single Best Answer MCQs (SBAs) and Short Answer Questions (SAQs). A formative midterm exam will take place during the middle of the semester.
<b>Language</b>	English