

COURSE SYLLABUS AND COURSE REQUIREMENTS

ACADEMIC YEAR 2024/2025 SEMESTER SPRING

<i>Course title</i>	Physiology
<i>Course Code</i>	MSM604ANEG
<i>Hours/Week: le/pr/lab</i>	2/0/2
<i>Credits</i>	6
<i>Degree Programme</i>	MSc
<i>Study Mode</i>	
<i>Requirements</i>	Oral exam
<i>Teaching Period</i>	1st year, 2 nd semester
<i>Prerequisites</i>	
<i>Department(s)</i>	Institute of Physiology
<i>Course Director</i>	Dr. Péczely László Zoltán
<i>Teaching Staff</i>	<i>Lecturers:</i> Péczely László Barabás Klaudia Jandó Gábor Környei József László Kristóf Zagoráczi Olga Ollmann Tamás Lengyel Ferenc Fusz Katalin Szabó István Varga Csaba Kovács Anita <i>Practice tutor:</i> Kóbor Péter

COURSE DESCRIPTION

A short description of the course (max. 10 sentences).

Neptun: Instruction/Subjects/Subject Details/Basic data/Subject description

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SYLLABUS

Neptun: Instruction/Subjects/Subject Details/Syllabus

1. GOALS AND OBJECTIVES

Goals, student learning outcome.

Neptun: Instruction/Subjects/Subject Details/Syllabus/Goal of Instruction

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2. COURSE CONTENT

Neptun: Instruction/Subjects/Subject Details/Syllabus/Subject content

TOPICS

LECTURE	<ol style="list-style-type: none"> 1. Introduction, homeostasis, basics of physiology 2. Muscle 3. Blood 4. Heart and circulation 5. Respiration 6. Digestion 7. Kidney, pH-regulation 8. Metabolism, thermoregulation 9. Endocrinology 10. Neurophysiology, sensory organs
PRACTICE LABORATORY PRACTICE	<ol style="list-style-type: none"> 1. Blood 2. Heart 3. ECG 4. Circulation 5. Respiration 6. Metabolic rate 7. Endocrinology 8. Skills Lab 9. Peripheral nerve I 10. Peripheral nerve II 11. Muscle 12. Central nervous system I 13. Central nervous system II

DETAILED SYLLABUS AND COURSE SCHEDULE

ACADEMIC HOLIDAYS INCLUDED

LECTURE

week	Topic	Compulsory reading; page number (from ... to ...)	Required tasks (assignments, tests, etc.)	Completion date, due date
1.	<ol style="list-style-type: none"> 1. Concept of homeostasis. Body fluid compartments. Signal transduction pathways, transport mechanisms and ion channels. Membrane potential. Resting membrane potential, electrotonic potentials. Action potential. 2. General properties of neurons and their functions. Interaction and communication between neurons. Neuronal networks. 	lecture slides	oral exam	in the exam period
2.	<ol style="list-style-type: none"> 1. The blood. Anorganic and organic blood constituents. Red blood cells. Hemoglobin. Blood groups. 2. Thrombocytes. Blood clotting. 	lecture slides	oral exam	in the exam period
3.	<ol style="list-style-type: none"> 1. Leukocytes. Immune system. 2. Physiology of muscles. Various types of muscles. 	lecture slides	oral exam	in the exam period

4.	<ol style="list-style-type: none"> 1. Heart physiology: pacemaker activity, conductive system, ECG. PCG. Physical aspects of the cardiac functions, the pumping and periodical activity of the heart. 2. Characteristics of the human circulation. Principles of hemodynamics. Pulse, blood pressure. 	lecture slides	oral exam	in the exam period
5.	<ol style="list-style-type: none"> 1. Regulation of the heart and circulation. 2. Respiration. Volume and pressure changes. Gas exchange. Regulation of respiration. 	lecture slides	oral exam	in the exam period
6.	<ol style="list-style-type: none"> 1. Structure and function of the gastrointestinal tract: digestion and absorption. Hormonal regulation of the GI tract. 2. Energy balance, metabolic rate and heat regulation. 	lecture slides	oral exam	in the exam period
7.	<ol style="list-style-type: none"> 1. Kidney. Glomerular filtration. Tubular transport mechanisms. Parameters of the renal function. 2. Volume, osmotic and pH regulation. 	lecture slides	oral exam	in the exam period
8.	<ol style="list-style-type: none"> 1. Mechanism of hormone action. Hypothalamo-hypophyseal control of hormonal secretion. ADH and oxytocin. Growth hormone. Prolactin. 2. Adrenal cortex and medulla. Endocrinology of stress and adaptation. 	lecture slides	oral exam	in the exam period
9.	<ol style="list-style-type: none"> 1. Structure, function and hormonal control of reproductive organs. Pregnancy. 2. Thyroid gland. Regulation of calcium and phosphate homeostasis. 	lecture slides	oral exam	in the exam period
10.	<ol style="list-style-type: none"> 1. Hormonal regulation of carbohydrate and intermediary metabolism. Liver functions. 2. Structure of the eye, optics, primary sensory processes in the retina and central visual information processing. 	lecture slides	oral exam	in the exam period

11.	1. Taste and smell. Hearing. 2. Proprioception, somatosensory mechanisms, pain and temperature sensation.	lecture slides	oral exam	in the exam period
12.	Spring break			
13.	1. Spinal cord. Reflexes. Coordination of body movements and balance. Extrapyramidal, cerebellar and cortical control of motion. Locomotion. 2. Central nervous regulation of homeostasis. Hypothalamus. Limbic system. Drive and motivation. Emotions.	lecture slides	oral exam	in the exam period
14.	1. Electrical activity of the brain, Electroencephalography, evoked potentials. Sleep-wakefulness. 2. Learning and memory. Plasticity and regeneration in the nervous system. Higher cognitive functions	lecture slides	oral exam	in the exam period
15.				

PRACTICE, LABORATORY PRACTICE

<i>week</i>	Topic	Compulsory reading; page number (from ... to ...)	Required tasks (assignments, tests, etc.)	Completion date, due date
1.	Blood. Red blood cell and differential leukocyte count, blood groups, osmotic resistance of red blood cells.	ppt slides	oral exam	week 14 and exam period
2.	Heart. In situ and isolated fish heart. Stannius ligatures. Cardiac cycle. Extrasystole.	ppt slides	oral exam	week 14 and exam period
3.	Electrocardiography and phonocardiography.	ppt slides	oral exam	week 14 and exam period
4.	Circulation. Arterial blood pressure and pulse. Microcirculation. Effects of adrenaline and acetylcholine.	ppt slides	oral exam	week 14 and exam period
5.	Respiration. Spirometry: lung volumes, capacities and dynamic parameters. Compliance.	ppt slides	oral exam	week 14 and exam period
6.	Measurement of metabolic rate. Basal and actual metabolic rate.	ppt slides	oral exam	week 14 and exam period
7.	Endocrinology: Estrous cycle, menstrual cycle. Pregnancy tests. Detection of blood glucose, glucose tolerance test, diabetes mellitus.	ppt slides	oral exam	week 14 and exam period
8.	SkillsLab	ppt slides	oral exam	week 14 and exam period
9.	Electrical stimulation of peripheral nerve. Electrotonic potentials, action potentials. Cathode make and anode break excitations.	ppt slides	oral exam	week 14 and exam period

10.	Compound and single fiber action potential, conduction velocity, chronaxy and rheobase.	ppt slides	oral exam	week 14 and exam period
11.	Muscle physiology: Summation, superposition, incomplete and complete tetanus. Fatigue. Electromyography.	ppt slides	oral exam	week 14 and exam period
12.	Spring break			
13.	Central nervous system physiology I.: Reflexes. Sensory systems.	ppt slides	oral exam	week 14 and exam period
14.	Central nervous system physiology II.: Electroencephalography, Stereotaxic technique.	ppt slides	oral exam	week 14 and exam period

3. ASSESSMENT AND EVALUATION

(Neptun: Instruction/Subjects/Subject Details/Syllabus/Examination and Evaluation System)

Oral exam.

Theoretical questions:

1. Concept of homeostasis. Body fluid compartments. Definition of neurotransmitters and hormones. Signal transduction pathways.
2. Transport mechanisms. Ion channels.
3. Membrane potential. Resting membrane potential, electrotonic potentials. Action potential.
4. General properties of neurons and their functions. Interaction and communication between neurons. Neuronal networks.
5. Autonomic nervous system.
6. Physiology of muscles. Various types of muscles.
7. The blood. Anorganic and organic blood constituents.
8. Red blood cells. Hemoglobin. Blood groups.
9. Thrombocytes. Blood clotting.
10. Leukocytes. Immune system.
11. Heart physiology: pacemaker activity, conductive system, ECG. PCG. Physical aspects of the cardiac functions, the pumping and periodical activity of the heart.
12. Characteristics of the human circulation. Principles of hemodynamics. Pulse, blood pressure.
13. Respiration. Volume and pressure changes. Gas exchange.
14. Regulation of the heart, the circulation, and the respiration.
15. Structure and function of the gastrointestinal tract: digestion and absorption.
16. Hormonal regulation of the GI tract.
17. Energy balance, metabolic rate and heat regulation.
18. Kidney. Glomerular filtration. Tubular transport mechanisms. Parameters of the renal function.
19. Volume, osmotic and pH regulation.
20. Mechanism of hormone action. Hypothalamo-hypophyseal control of hormonal secretion. ADH and oxytocin. Growth hormone. Prolactin.
21. Adrenal cortex and medulla. Endocrinology of stress and adaptation.
22. Structure, function and hormonal control of reproductive organs. Pregnancy.
23. Thyroid gland.
24. Regulation of calcium and phosphate homeostasis.
25. Hormonal regulation of carbohydrate and intermediary metabolism.
26. Liver functions.
27. Structure of the eye, optics, primary sensory processes in the retina and central visual information processing.
28. Taste and smell.
29. Hearing.
30. Spinal cord. Reflexes.

31. Coordination of body movements and balance. Extrapyramidal, cerebellar and cortical control of motion. Locomotion.
32. Proprioception, somatosensory mechanisms, pain and temperature sensation.
33. Central nervous regulation of homeostasis. Hypothalamus. Limbic system. Drive and motivation. Emotions.
34. Electrical activity of the brain, Electroencephalography, evoked potentials. Sleep-wakefulness.
35. Learning and memory. Plasticity and regeneration in the nervous system.
36. Higher cognitive functions.

Practices:

1. Blood. Red blood cell and differential leukocyte count, blood groups, osmotic resistance of red blood cells.
2. Muscle physiology: Summation, superposition, incomplete and complete tetanus. Fatigue. Electromyography.
3. Heart. In situ and isolated frog's heart. Stannius ligatures. Cardiac cycle. Extrasystole.
4. Electrocardiography and phonocardiography.
5. Circulation. Arterial blood pressure and pulse. Microcirculation. Effects of adrenaline and acetylcholine.
6. Respiration. Spirometry: lung volumes, capacities and dynamic parameters. Compliance.
7. Measurement of metabolic rate. Basal and actual metabolic rate.
8. Endocrinology: Estrous cycle, menstrual cycle. Pregnancy tests. Detection of blood glucose, glucose tolerance test, diabetes mellitus.
9. Electrical stimulation of peripheral nerve. Electrotonic potentials, action potentials. Cathode make and anode break excitations.
10. Compound and single fiber action potential, conduction velocity, chronaxy and rheobase.
11. Central nervous system physiology I.: Reflexes. Sensory systems.
12. Central nervous system physiology II.: Electroencephalography, Stereotaxic technique. Non-invasive imaging techniques.

ATTENDANCE

In accordance with the Code of Studies and Examinations of the University of Pécs, Article 45 (2) and Annex 9. (Article 3) a student may be refused a grade or qualification in the given full-time course if the number of class absences exceeds 30% of the contact hours stipulated in the course description.

Method for monitoring attendance (e.g.: attendance sheet / online test/ register, etc.)

Attendance sheet.

ASSESSMENT

Cells of the appropriate type of requirement is to be filled out (course-units resulting in mid-term grade or examination). Cells of the other type can be deleted.

Course resulting in mid-term grade (PTE TVSz 40§(3))

Mid-term assessments, performance evaluation and their ratio in the final grade (The samples in the table to be deleted.)

Type	Assessment	Ratio in the final grade
<i>e.g.: Test 1</i>	<i>eg. max 20 points</i>	<i>eg. 20 %</i>
<i>e.g.: Test 2</i>	<i>eg. max 30 points</i>	<i>eg. 30 %</i>
<i>e.g.: home assignment (project documentation)</i>	<i>eg. max 30 points</i>	<i>eg. 30 %</i>
...	<i>eg. max 15 points</i>	<i>eg. 20 %</i>

Opportunity and procedure for re-takes (PTE TVSz 47§(4))

The specific regulations for improving grades and resitting tests must be read and applied according to the general Code of Studies and Examinations. E.g.: all tests and assessment tasks can be repeated/improved at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

...

Grade calculation as a percentage

based on the aggregate performance according to the following table

Course grade	Performance in %
excellent (5)	85 % ...
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

The lower limit given at each grade belongs to that grade.

Course-unit with final examination

Mid-term assessments, performance evaluation and their weighting as a pre-requisite for taking the final exam

(The samples in the table to be deleted.)

Type	Assessment	Weighting as a proportion of the pre-requisite for taking the exam
1. e.g.: Test 1	eg. max 20 points	eg. 20 %
2. e.g.: Test 2	eg. max 30 points	eg. 30 %
3. e.g.: home assignment (project documentation)	eg. max 30 points	eg. 30 %
4. ...	eg. max 15 points	eg. 20 %

Requirements for the end-of-semester signature

(Eg.: mid-term assessment of 40%)

Attendance of the lectures and practices is mandatory, more than 40% absences implies the refusal of the end-of-semester signature.

Re-takes for the end-of-semester signature (PTE TVSz 50§(2))

The specific regulations for grade betterment and re-take must be read and applied according to the general Code of Studies and Examinations. E.g.: all the tests and the records to be submitted can be repeated/improved each at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

Type of examination (written, oral): **oral**

The exam is successful if the result is minimum ... %. (The minimum cannot exceed 40%.)

Calculation of the grade (TVSz 47§ (3))

In the exam the students have to report 3 topics: 2 theoretical related to the lectures and 1 related to the practice.

Calculation of the final grade based on aggregate performance in percentage.

In each exam topic the grade should be minimally mark 2 (satisfactory). The final grade is calculated averaging the three subgrades.

Course grade	Performance in %
excellent (5)	85 % ...
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %

fail (1)	below 40 %
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The lower limit given at each grade belongs to that grade.

4. SPECIFIED LITERATURE

In order of relevance. (In Neptun ES: Instruction/Subject/Subject details/Syllabus/Literature)

COMPULSORY READING AND AVAILABILITY

[1.] Lecture slides (uploaded in Teams)

RECOMMENDED LITERATURE AND AVAILABILITY

[2.] Guyton and Hall: Textbook of Medical Physiology

[3.] Silbernagl, Despopoulos: Color Atlas of Physiology