



Course unit (module) title	Code
Moder Neurorehabilitation	

Academic staff	Core academic unit(s)
Coordinating: assoc.prof. Nerijus Masiulis Other:-	Faculty of Medicine, Institute of Health Sciences, Department of Rehabilitation, Physical and Sports Medicine, Akademijos g. 4.

Study cycle	Type of the course unit
2 st cycle	Compulsory

Mode of delivery	Semester or period when it is delivered	Language of instruction
Face-to-face/ remote	II semester	Lithuanian

Requisites	
Prerequisites:-	Co-requisites (if relevant):-

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
10	270	114	156

Purpose of the course unit		
Purpose of the study subject – to provide knowledge about the effect of physical activity on the physiological, biochemical and neuromechanical mechanisms of the human organism, develop the abilities to model physical activity programs and evaluate their effectiveness.		
Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
Demonstrate knowledge of the body's physiological, biochemical and neuromechanical mechanisms through physical activity programmes of varying intensity and duration.	Case-based learning. Demonstration. Individual presentation assignments at the seminar.	Exam.
Ability to critically analyse scientific literature, identify relevant issues in the application of personalised physical activity and apply research findings to improve professional practice.	Studying and providing an overview of scientific articles. Practical work in a clinical setting (individual and group). Case studies, presentation, discussion. Case modelling, presentation, discussion. Preparation and presentation of case report.	Assessment of the appropriateness of the selection of scientific articles, completeness of overview. Formative evaluation of case studies and modelling in seminars. Assessment of the case description. Exam.
Ability to design, apply and critically analyse a range of physical activity programmes, taking into account the age and disease characteristics of patients and based on sound and up-to-date scientific evidence.		
Ability to express accurate and reasoned ideas in oral and written form, communicating the basic ideas, principles		

and biological mechanisms of physical activity programmes.		
Ability to communicate and cooperate with rehabilitation and other professionals and patients.		
Ability to critically analyse scientific literature, identify relevant issues in the application of personalised physical activity and apply research findings to improve professional practice.		
Ability to reflect objectively on their own and other students' academic achievements and to anticipate their professional development prospects.	Individual presentation of the assignment at the workshop.	Discussion and formative assessment during seminars.
Ability to make independent decisions in the implementation of individualised physical activity programmes in accordance with professional ethics.		

Content	Contact hours							Individual work: time and assignments	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship	Contact hours, total	Individual work	Tasks for individual work
1.Muscle contraction and relaxation mechanisms, types of contraction, post-activation potentiation, fatigue, damage, phenomenon of the repeating load	4		7				11	14	Studying of scientific articles
2.Physical activity – best “medicament”. Healthy ageing. Myokines, adipokines, hepatokines	3		8				11	12	Studying of scientific articles
3.Effect of physical activity on the prevention and rehabilitation of the motor system diseases; sarcopenia; strengthening of muscles, fasciae, tendons and bones	4		7				11	14	Studying of scientific articles Case analysis-interpretation considering the patient’s age and disorder, modelling of the physical activity program
4.Effect of physical activity on the prevention and rehabilitation of neurodegenerative diseases	4		7				11	14	Studying of scientific articles
5.Effect of physical activity on psychical health and improvement and restoration of mental working ability. Non-pharmacological technologies of stress reduction	3		8				11	14	Studying of scientific articles
6.Effect of physical activity on the prevention and rehabilitation of cardiovascular and respiratory diseases	3		7				10	14	Studying of scientific articles Case analysis-interpretation considering the patient’s age and disorder, modelling of the physical activity program

7. Effect of physical activity on the reduction of the metabolic syndrome and obesity. Healthy and unhealthy metabolic obesity. Non-pharmacological technologies of obesity elimination	3		7				10	16	Studying of scientific articles Case analysis-interpretation considering the patient's age and disorder, modelling of the physical activity program
8. Effect of physical activity on the prevention of oncological diseases	2		7				9	14	Studying of scientific articles
9. Principles of coordination of physical activity and nutrition	2		7				9	16	Studying of scientific articles
10. Principles and models of compilation of individual physical activity programs	2		8				10	14	Studying of scientific articles
11. Principles and models of implementation of scientific achievements in practice of physical activity	4		7				11	16	Studying of scientific articles
Total	34		80				114	156	

Assessment strategy	Weight %	Deadline	Assessment criteria
Assessment of the compiled physical activity program and its presentation (X1)	40	In the semester	The physical activity program is assessed in a 10-point scale. Criteria of assessment and maximum points: – Scientific substantiation of the program (5 points); Clear and reasoned presentation of the program (5 points).
Presentation of the conclusions of scientific articles (presentation of <i>Power Point</i>). (X2)	20	In the semester	The presentation is assessed in a 10-point scale. Criteria of assessment and maximum points: – revelation of relevance of the research (1 point); – revelation of logic of the research (4 points); – purposiveness of the visual presentation of the material by means of multimedia (presentation of PowerPoint) (2 points); – management of the presentation time (1 point); – answers to questions: comprehensiveness, substantiation with arguments (2 points). The total point of assessment of the presentation is calculated by adding the points of all the assessment fields.
Examination (it is allowed taking it in case of the positive assessment of the presentation of the conclusions of the physical activity program and scientific articles). (Y)	40	In the session	The examination (test) consists of closed-type questions with a few possible answers that can be false and true. The point of the test is calculated according to the formula: $\text{Test point} = \sum_{i=1}^n \left(\frac{t^i}{m^i} \right) * 10/n$ where t^i – number of correctly marked answers in the question; n – number of questions. The maximum assessment of the test is 10 points.
Mark of the cumulative assessment: $A = 0,4 * X1 + 0,2 * X2 + 0,4 * Y$			

Author	Publishing year	Title	Issue of a periodical or volume of a publication; pages	Publishing house or internet site
Required reading				
Skurvydas A.	2020	Judesių mokslas.	Vadovėlis: II dalis: Sportas, pratimai, mityba, sveikata.	Kaunas, Vitae Litera.

Bay, M. L., & Pedersen, B. K.	2020	Muscle-Organ Crosstalk: Focus on Immunometabolism .	<i>Frontiers in physiology</i> , 11, 567881. https://doi.org/10.3389/fphys.2020.567881 .	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Severinsen, M., & Pedersen, B. K.	2020	Muscle-Organ Crosstalk: The Emerging Roles of Myokines.	<i>Endocrine reviews</i> , 41(4), 594–609. https://doi.org/10.1210/endrev/bnaa016 .	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Booth, F. W., Roberts, C. K., Thyfault, J. P., Ruegsegger, G. N., & Toedebusch, R. G.	2017	Role of Inactivity in Chronic Diseases: Evolutionary Insight and Pathophysiological Mechanisms.	<i>Physiological reviews</i> , 97(4), 1351–1402. https://doi.org/10.1152/physrev.00019.2016	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Ruegsegger, G. N., & Booth, F. W.	2018	Health Benefits of Exercise.	<i>Cold Spring Harbor perspectives in medicine</i> , 8(7), a029694. https://doi.org/10.1101/cshperspect.a02969	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Pedersen, B.K., Saltin B.	2015	Exercise as medicine – evidence for prescribing exercise as therapy in 26 different chronic diseases.	<i>Scandinavian Journal of Medicine and Science in Sports</i> , 25 (3), 1-72. https://doi.org/10.1111/sms.12581 .	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Stillman CM, Esteban-Cornejo I, Brown B, Bender CM, Erickson KI.	2020	Effects of Exercise on Brain and Cognition Across Age Groups and Health States.	<i>Trends Neurosci.</i> 2020 Jul;43(7):533-543. doi: 10.1016/j.tins.2020.04.010. Epub 2020 May 11. PMID: 32409017.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Bray GA, Frühbeck G, Ryan DH, Wilding JP.	2016	Management of obesity.	<i>Lancet.</i> 2016 May 7;387 (10031):1947-56. doi: 10.1016/S0140-6736(16)00271-3. Epub 2016 Feb 10. PMID: 26868660.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Pedersen, B. K.	2018	Molecular mechanisms linking exercise to cancer prevention and treatment.	<i>Cell Metabolism</i> , 27(1), 10–21. doi: 10.1016/j.cmet.2017.09.015.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Piercy KL, Troiano RP, Ballard RM, Carlson SA, Fulton JE, Galuska DA, George SM, Olson RD	2018	The Physical Activity Guidelines for Americans.	<i>JAMA.</i> 2018 Nov 20;320 (19):2020-2028. doi: 10.1001/jama.2018.14854. PMID: 30418471.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.

Recommended reading				
Neufer, P. D., Bamman, M. M., Muoio, D. M., Bouchard, C., Cooper, D. M., ... Laughlin, M. R.	2015	Understanding the Cellular and Molecular Mechanisms of Physical Activity-Induced Health Benefits.	<i>Cell Metabolism</i> , 22(1), 4–11. doi: 10.1016/j.cmet.2015.05.011. Epub 2015 Jun 11).	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Green DJ, Hopman MT, Padilla J, Laughlin MH, Thijssen DH.	2017	<u>Vascular Adaptation to Exercise in Humans: Role of Hemodynamic Stimuli.</u>	<i>Physiol Rev.</i> 2017 Apr;97 (2):495-528. doi: 10.1152/physrev.00014.2016. Review.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
de Cabo R, Mattson MP.	2019	Effects of Intermittent Fasting on Health, Aging, and Disease.	<i>N Engl J Med.</i> 2019 Dec 26;381(26):2541-2551. doi: 10.1056/.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Kaeberlein, M., Rabinovitch, P. S. ir Martin, G. M	2015	Healthy aging: The ultimate preventative medicine.	<i>Science</i> , 350(6265), 1191–1913. doi: 10.1126/science.aad3267.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Čekanauskaitė A, Skurvydas A, Žlibinaitė L, Mickevičienė D, Kilikevičienė S, Solianik R.	2020	A 10-week yoga practice has no effect on cognition, but improves balance and motor learning by attenuating brain-derived neurotrophic factor levels in older adults.	<i>Exp Gerontol.</i> 2020 Sep;138:110998. doi: 10.1016/j.exger.2020.110998. Epub 2020 Jun 13. PMID: 32544572.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Skurvydas A, Jurgelaitiene G, Kamandulis S, Mickeviciene D, Brazaitis M, Valanciene D, Karanauskiene D, Mickevicius M, Mamkus G.	2019	What are the best isometric exercises of muscle potentiation?	<i>Eur J Appl Physiol.</i> 2019 Apr;119(4):1029-1039. doi: 10.1007/s00421-019-04092-y. Epub 2019 Feb 7. PMID: 30734104.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Skurvydas A, Mamkus G, Kamandulis S, Dudonienė V, Valanciene D, Westerblad H.	2016	Mechanisms of force depression caused by different types of physical exercise studied by direct electrical stimulation of human quadriceps muscle.	<i>Eur J Appl Physiol.</i> 2016 Dec;116(11-12):2215-2224. doi: 10.1007/s00421-016-3473-0. Epub 2016 Sep 16. PMID: 27637589; PMCID: PMC5118408.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Rey Lopez JP, Sabag A, Martinez Juan M, Rezende LFM, Pastor-Valero M.	2020	Do vigorous-intensity and moderate-intensity physical activities reduce mortality to the same extent? A systematic review and meta-analysis.	<i>BMJ Open Sport Exerc Med.</i> 2020 Oct 5;6(1):e000 775. doi: 10.1136/bmjsem-2020-000775. PMID: 33178440; PMC ID: PMC7610342.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
O'Keefe EL, Torres-Acosta N, O'Keefe JH, Lavie CJ.	2020	Training for Longevity: The Reverse J-Curve for Exercise.	<i>Mo Med.</i> 2020 Jul-Aug;117(4): 355-361. PMID: 32848273; PMCID: PMC7431070.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.
Lear SA, Hu W, Rangarajan S, Gasevic D, Leong D, Iqbal R, Casanova A, Swaminathan S, Anjana RM, Kumar R, Rosengren	2017	The effect of physical activity on mortality and cardiovascular disease in 130 000	<i>Lancet.</i> 2017 Dec 16;390 (10113):2643-2654. doi: 10.1016/S0140-6736(17) 31634-3. Epub 2017 Sep 21.	Prisijungus prie VU prenumeruojamų duomenų bazių prieigos.

A, Wei L, Yang W, Chuangshi W, Huaxing L, Nair S, Diaz R, Swidon H, Gupta R, Mohammadifard N, Lopez-Jaramillo P, Oguz A, Zatonska K, Seron P, Avezum A, Poirier P, Teo K, Yusuf S.		people from 17 high-income, middle-income, and low-income countries: the PURE study.		
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NOTE: Including Open Educational Resources in the reading list is recommended