Course Title	**Neurological Physiotherapy I**				
Course Code	PHYS209				
Course Type	Compulsory				
Level	Bachelor (Level 1)				
Year / Semester	2^{d}/ Fall				
Instructor's Name	Dr. Julia Moissoglou Missitzi, Michail Pantouveris				
ECTS	6	**Lectures / week**	2	**Laboratories/week**	2
Course Purpose	To provide special knowledge and skills related to the field of neurological physiotherapy. In addition, the student becomes familiar with the methods and techniques of physiotherapeutic approaches and the mechanisms of influence of different therapeutic means and exercise programs on patients with neurological disorders. In particular, the course aims to identify the specificity of each method individually chosen. At the same time, the course aims to convey to students the correlation of modern findings in the field of neurophysiology with the clinical methods of physiotherapeutic evaluation of patients with neurological problems.				
Learning Outcomes	By the end of the course, the student will be able to: • describe the physiological and pathological mechanisms of motor control of posture, movement and balance, • choose assessment tools and set therapeutic goals in disorders of the nervous system, • interpret and apply the basic principles governing neuroplasticity and motor learning in clinical practice, • evaluate somatosensory and cognitive deficits and sets appropriate therapeutic targets • recognize motor deficits and disorders of muscle tone • appreciate physiotherapeutic interventions - exercise programs and interprets their effect • evaluate the specific characteristics of each method chosen in rehabilitation, (PNF, Bobath, Garrand Shepperd, and any other method that occurs in rehabilitation) • choose the method that is in accordance with the objectives and expectations • recognize the reaction-response mechanisms of the organism to the chosen method,				

	• differentiate the way the basic theories of motor control evolved, as well as to relate them to the established, but also the developing therapeutic approaches and techniques, • evaluate and chooses the method indicated in the pathology and the particularities of each patient. • synthesize and applies the appropriate methods of physiotherapeutic evaluation and treatment, based on the existing techniques of neuromuscular retraining. • **Comprehend and familiarize with contemporary digital assessment and treatment approaches of neurological conditions(telephysiotherapy assessment and treatment)** • **Collaborate and interact with members of the mulrudisciplinary team including, physicians, speech therapists, occupational therapists, psychologists, nurses, orthotists, podiatrists, social workers etc.** • **Implement the ICF system for disorders of the central and peripheral nervous system (brain, spinal cord & peripheral nerves** Upon completion of the laboratory part of the course, the learner is expected to be able to: • demonstrate the physiological and pathological reflexes, the mechanisms that give them off and the ways of their manifestation • apply basic techniques of the methods of proprietary neuromuscular facilitation (PNF), neurodevelopmental education-Bobath • select and applies the appropriate clinical tools for the evaluation of the neuromuscular condition, • synthesize and applies the appropriate methods physiotherapeutic treatment, based on the findings of clinical evaluation, existing neuromuscular retraining techniques and the research documentation of these techniques, **according to the 'International Classification System'**		
Prerequisites	None	Co-requisites	None
Course Content	• Introduction Models of disability. Evaluation and classification (ICD-ICF) for **disorders of the central and peripheral nervous system** • **Rehabilitation team/ Interdisciplinary collaboration (physicians, speech therapists, occupational therapists, psychologists, nurses, orthotists, podiatrists, social workers etc).** • Basic principles of physical therapy management of neurological patients' disorders Assessment, measurement and goal- setting The assessment process-frames of reference Measuring tools/selection criteria Goal setting - basic principles Motor development		

	Theories of motor development Typical motor development Fundamental movement patterns • Motor control Theories of motor control Physiology of motor control Clinical applications • Postural and motor control Postural/motor control mechanisms Motor and sensory strategies Disorders of postural /motor control • Somatosensory system and cognitive function Definition and neurophysiology Disorders of the somatosensory system Disorders of cognitive function- Effects on executive skills Assessment and physical therapy intervention • Motor learning Theories of motor learning Stages of motor learning Factors affecting learning process • Neuroplasticity Mechanisms of neuroplasticity Maladaptive and adaptive neuroplasticity Basic principles/interpretation and application in clinical practice Neuroplasticity and motor learning • Muscletone/ Muscletone disorders Definition/ classification/ neurophysiology Disorders (spasticity, stiffness, dystonia, hypotonia, chorea, athetosis) Assessment methods - clinical laboratory Treatment techniques for muscle tone disorders Adapted seat/splints • Therapeutic interventions in neurological physical therapy I Neurodevelopmental treatment (NDT), Proprioceptive neuromuscular facilitation (PNF), reflex locomotion (Vojta), Brunnstrom Method. Theoretical framework, basic principles-application techniques • Pain management in neurological disorders Neurophysiology and classification Assessment Modalities • **Innovative technology in neurological physical therapy**

	Robotic technology and systems **Virtual Reality** **Interactive games** **Digital physiotherapy** **Laboratory** During the laboratory sessions, students develop their clinical skills in skill models and patient simulators or in small groups of implementation of exercise programs (role playing) so that they can successfully and safely apply all therapeutic techniques in a real clinical environment. In addition, experiential activities related to the understanding of sensorimotor disorders (e.g. conception and recognition of an object with closed eyes) are carried out. **They also practice their skills in the ICF system for classification of disorders of the central and peripheral nervous system (**
Teaching Methodology	**Theory** The course is delivered to the students through lectures, using computer-based presentations programmes. Case Studies, Discussion, Questions / Answers are also used depending on the content of the lecture. Lecture notes and presentations are available online for use by students in combination with textbooks. Relevant material published in international scientific journals is also used to follow the latest developments related to the subject of the course. **Laboratory** During the laboratory courses, students develop their clinical skills in skill trainers and patient simulators so that they can successfully and safely apply them in a real clinical environment.
Bibliography	**<u>Textbooks:</u>** Barnes M., Johnson G. (2008). Upper motor neuron syndrome and spasticity. Parisianos Publications, Boelen M. (2009). Health professional's guide to physical management of Parkinson's disease. Εκδόσεις Human kinetics; 1st edition. Car J., Shepherd R. (2013) Neurological Rehabilitation. Optimizing Motor Performance. 2nd edition. Parisianos Publications. Lennon S, Ramdharry G, Verheyden G. (2020) Physiotherapeutic Management for Patients with Neurological Disorders. Broken Hill Publishers Ltd. Martin S., Kessler M. (2015) Neurologic interventions for physical therapy. Elsevier; 3rd edition. Nichols-Larsen D. (2017). Neurological Rehabilitation, KONSTANTARAS Publications.

Raine S., Meadows L., Lynch-Ellerington M. (2009). Bobath concept – Theory and clinical practice in neurological rehabilitation. Εκδόσεις Wiley-Blackwell

Shumway-Cook A., Woollacott M. (2012) Motor Control. From Research to Clinical Practice. 3rd edition. Publications: P. C. Paschalidis.

Umphred D. A. (2006). Neurological Rehabilitation. Εκδόσεις Mosby.

References:

Aboutorabi A, Arazpour M, Bahramizadeh M, Farahmand F, Fadayevatan R. Effect of vibration on postural control and gait of elderly subjects: a systematic review. Aging Clin Exp Res. 2018;30(7):713–726.

Brito, Sherindan Ayessa Ferreira de, et al. (2022) Measurement properties of outcome measures used in neurological telerehabilitation: A systematic review protocol. PloS one 17.3 e0265841.

Donath L, Rossler R, Faude O. (2016) Effects of virtual reality training (exergaming) compared to alternative exercise training and passive control on standing balance and functional mobility in healthy community-dwelling seniors: a meta-analytical review. Sports Med. 46(9):1293–1309.

Farlie MK, Robins L, Haas R, Keating JL, Molloy E, Haines TP. (2018) Programme frequency, type, time and duration do not explain the effects of balance exercise in older adults: a systematic review with a meta-regression analysis. Br J Sports Med. [epub ahead of print] https://doi.org/10. 1136/bjsports-2016-096874.

Kwakkel G, Veerbeek JM, van Wegen EE, Wolf SL. (2015) Constraint-induced movement therapy after stroke. Lancet Neurol. 14(2):224-34

Lohse KR, Pathania A, Wegman R, Boyd LA, Lang CE. On the reporting of experimental and control therapies in stroke rehabilitation trials: a systematic-review. Arch Phys Med Rehabil. 2018;99(7):1424–1432.

Tedla, Jaya Shanker, et al. (2022) Effectiveness of Constraint-Induced Movement Therapy (CIMT) on Balance and Functional Mobility in the Stroke Population: A Systematic Review and Meta-Analysis. Healthcare. Vol. 10. No. 3. MDPI.

Sibley J. B. (2022). Meeting the Future: How CME Portfolios Must Change in the Post-COVID Era. Journal of European CME, 11(1), 2058452.

Vaughan-Graham J, Cott C. (2016) Defining a Bobath clinical framework - A modified e-Delphi study. Physiotherapy Theory Pract. 32(8):612-627.

Veerbeek JM, van Wegen E, van Peppen R, et al. (2014) What is the evidence for physical therapy poststroke? A systematic review and meta-analysis. PLoS One.9:e87987.

	Warutkar V, Gulrandhe P, Morghade S, et al. (2022) Physiotherapy for Multiple Sclerosis Patients From Early to Transition Phase: A Scoping Review. Cureus 14(10): e30779. doi:10.7759/cureus.30779
Assessment	**<u>Continuous Assessment (50%):</u>** The assessment may include any combination of the following: • **Written and/or oral**, and it consists of multiple – choice, short answer, open ended questions and/or essay questions, that align with the learning outcomes, in order to assess the theoretical knowledge gained. The questions ensure that students will demonstrate a deep understanding of the subject matter and apply their knowledge to solve problems or analyse scenarios. • **Assignments and projects** provide opportunities for students to apply their theoretical knowledge in practical ways. The assignments are designed in a way that require critical thinking, research, analysis, and synthesis of information. Projects can be individual, self directed learning or group-based and should align with the learning outcomes. Students are evaluated on the quality of their work, the depth of understanding displayed, and their ability to effectively communicate their ideas. Assignments and projects may be individual or group work. • Use of **case studies or problem-solving exercises** to assess how students can apply theoretical knowledge to real-life situations. Students are presented with scenarios that require analysis, critical thinking, and the application of theoretical concepts and they are assessed based on their ability to perform verbal presentations, viva voce examinations, identify and evaluate relevant information, propose solutions, and provide justifications for their choices. • **Online quizzes or interactive assessments**: Online quizzes or interactive assessments, reflective writing can be used through the Moodle platform, to create quizzes with various question formats. These assessments can be self-paced or timed, and immediate feedback can be provided to students. • **Classroom discussions and debates**: Students engage in classroom discussions and debates to assess their theoretical knowledge. Active participation is encouraged to hone their critical thinking skills by posing open-ended questions and facilitating dialogue. • **Peer and self-assessment**: Students are assigned to review and provide feedback on each other's work, encouraging them to critically evaluate their peers' understanding and provide constructive suggestions. **Laboratory** evaluation consists of assessment of the expected skills and competences, critical thinking, problem-solving and teamwork skills. During the laboratory sessions, students are closely observed as they engage in the assigned tasks and note is taken regarding the actions, approach and any relevant observations that demonstrate their understanding of the subject matter and application of skills. After assessing the laboratory work, constructive feedback is provided to students. Their strengths and areas for improvement are highlighted, linking them back to the learning outcomes to help students understand their

	progress and guide them towards further development. Depending on the nature of the laboratory work, peer assessment can be incorporated, where students evaluate each other's work based on the established criteria to promote self-reflection, collaboration, and a deeper understanding of the subject matter. **Final Exam (50%):** comprehensive final exam, to assess students' overall theoretical knowledge. These assessments cover a broader range of topics and learning outcomes from the entire program of study, to gauge the students' understanding and integration of knowledge across different areas.
Language	Greek / English