Course Title	**Electrotherapy – Physical Modalities I**				
Course Code	PHYS208				
Course Type	Compulsory				
Level	Bachelor (Level 1)				
Year / Semester	2^{d}/Spring				
Instructor's Name	Dr Emmanuel Papadopoulos				
ECTS	6	**Lectures / week**	2	**Laboratories/week**	2
Course Purpose	The purpose of this course is to study and teach the application of various types of Electrical Stimulation (HE) through electric currents in the human body. The aim of the course is to familiarize students with the design and implementation of treatment regimens in various diseases, injuries and syndromes, choosing the appropriate treatment protocols, with the appropriate order of application.				
Learning Outcomes	• Upon successful completion of the course, students will: Know the indications and contraindications, as well as the physiological effects of electrical irritation. They will be able to describe the therapeutic objectives and expected results, as well as the possible risks or side effects. They will have the necessary knowledge and skills to evaluate their patients and apply the appropriate treatment regimens and protocols for the application of clinical electrical irritation. They will be able to actively participate in the interdisciplinary rehabilitation team with other specialties of health scientists, where necessary (multidisciplinary meetings). • Upon completion of the laboratory part of the course, the learner is expected to be able to: choose the appropriate type and form of electrical stimulation according to the clinical case They will be able to apply the appropriate type and form of electrical stimulation depending on the clinical case They will be able to combine different already and types of electrical irritation depending on the initial evaluation and reassessment **and the classification of their disorders according to the ICF system of dysfunction.** They will be able to re assess and They adjust the therapeutic application of electrical irritation, depending on the variation of symptoms and the stage of recovery.				
Prerequisites	None	Co-requisites	None		
Course Content	• **Clinical reasoning techniques based on assessment and the ICF classification of disorders and dysfunctions (pain, disability, muscle weakness etc)** • Introduction to Electrical Irritation: Essentials of electrical stimulation physics. Classification and types of electrical therapeutic currents. Detailed description of the design parameters of clinical electrical stimulation.				

	• Biophysical-biological effects of electrical irritation: Physiological effects of electrical stimulation. Thermal, chemical effects and contraindications of electrical stimulation. • Electrical muscle irritation of innervated muscles: Indications, description, analysis and justification of application parameters • Electrical Muscle stimulation of Denervated Muscles: Neurophysiology of muscle contraction after denervation. Indications, Description, analysis and justification of application parameters. • Special instructions for the application of Electrical Muscle stimulation of Denervated Muscles: Application methods. Examples of application in specific diseases and injuries of peripheral nerves. • Sensory Electrical stimulation TENS: Indications and results. Description, analysis and justification of electrical parameters • Sensory Electrical stimulation, Interferential Currents: Indications and results. Description, analysis and justification of electrical irritation parameters with interferential currents. • Electrical irritation in diseases of the central nervous system (CNS): Applications of electrical muscle irritation. Implementation of TENS. Special applications for the reduction of spasticity, for motor retraining and muscle activation in CNS diseases. • Functional Electrical Stimulation (FES): therapeutic functional applications • Iontophoresis: Indications and results. Description, analysis and justification of electrical irritation parameters in iontophoresis. • Electromyography – Superficial EMG evaluation of peripheral torso muscles and limbs. Nerve conduction velocity study. Neuromotor system retraining with Electromyographic Biological Refeeding (EMG-Biofeedback). • Special therapeutic applications of electrical stimulation Reduction of post-radiation
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	**Textbooks:**

Mackler L, Robinson A. 2008, Clinical Electrophysiology: Electrotherapy and Electrophysiologic Testing. Third Edition. Baltimore, MD: Wolters Kluwer – Lippincott Williams & Wilkins.

Nelson RM, Currier DP, Hayes KW. 1999 Clinical Electrotherapy. Third Edition. USA: Apleton & Lange, Robertson V, Ward A, Low J, et al. Electrotherapy Explained. Principles and Practice. 4th Edition. Edinburgh: Butterworth Heinemann, 2006.

Robertson V, Ward A, Low J, et al. 2011, Ηλεκτροθεραπεία – Βασικές Αρχές και Πρακτική Εφαρμογή. 4η Έκδοση. Αθήνα: Εκδόσεις Παρισιάνου Α.Ε.

Prentice WE. (2018) Therapeutic Modalities in Rehabilitation, McGraws-Hill Books.

Bellew JW., Michlovitz SL. (2016) Michlovitz's Modalities for Therapeutic Intervation, (Kindle Edition), Davis Company, Philadelphia.

Denegar C., (2015). Therapeutic Modalities for Musculoskeletal Injuries, Human Kinetics,

Knight KL., Draper DO. (2013) Therapeutic Modalities: The Art and Science, Lippincott Williams and Wilkins, Philadelphia, USA.

Matijaca A. (2009). Electro-Therapy in the Abstract for the Busy Practitioner. General Books.

Robinson A.J, Snyder-Mackler L. (2007). Clinical Electrophysiology: Electrotherapy and Electrophysiologic Testing. 3rd ed. Lippincott Williams & Wilkins.

Watson T. (2008). Electrotherapy: evidence-based practice.

Zimetbaum P.J., Josephson M.E. (2008). Practical Clinical Electrophysiology. 1st ed. Lippincott Williams & Wilkins, Philadelphia.

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References:

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de Sire, Alessandro, et al. "Non-Surgical and Rehabilitative Interventions in Patients with Frozen Shoulder: Umbrella Review of Systematic Reviews." Journal of pain research (2022): 2449-2464.

	Antunes, Mateus Dias, and Amélia Pasqual Marques. "The role of physiotherapy in fibromyalgia: Current and future perspectives." Frontiers in Physiology 13 (2022): 1701. de Castro-Carletti EM, Müggenborg F, Dennett L, et al. Effectiveness of electrotherapy for the treatment of orofacial pain: A systematic review and meta-analysis. Clinical Rehabilitation. 2023;0(0). doi:10.1177/02692155221149350 Juckett, L.; Saffari, T.M.; Ormseth, B.; Senger, J.-L.; Moore, A.M. The Effect of Electrical Stimulation on Nerve Regeneration Following Peripheral Nerve Injury. Biomolecules 2022, 12, 1856. https://doi.org/10.3390/biom12121856 Papadopoulos ES, Mani R. The Role of Ultrasound Therapy in the Management of Musculoskeletal Soft Tissue Pain. The International Journal of Lower Extremity Wounds. 2020;19(4):350-358. doi:10.1177/1534734620948343 Patsaki, I., Gerovasili, V., Sidiras, G., Karatzanos, E., Mitsiou, G., Papadopoulos, E., ... & Nanas, S. (2017). Effect of neuromuscular stimulation and individualized rehabilitation on muscle strength in intensive care unit survivors: a randomized trial. Journal of critical care, 40, 76-82. E. Karatzanos, V. Gerovasili, D. Zervakis, E. Papadopoulos**,** S. Nanas et al (2012) Electrical Muscle Stimulation: An Effective Form of Exercise and Early Mobilization to Preserve Muscle Strength in Critically Ill Patients, Critical Care Research and Practice, Volume 2012, Article ID 432752, 8 pages, doi:10.1155/2012/432752 Papadopoulos E**.,** Patsaki I., Christakou A., Nanas S. (2013). Therapeutic applications of neuromuscular electrical stimulation in intensive care. Hospital Chronicles: Volume 8, No 3. p. 112-119. Castana, O., Dimitrouli, A., Argyrakos, T., Theodorakopoulou, E., Stampolidis, N., Papadopoulos, E., ... & Poulas, K. (2013). Wireless electrical stimulation: an innovative powerful tool for the treatment of a complicated chronic ulcer. The international journal of lower extremity wounds, 12(1), 18-21. Papadopoulos, E. S., et al. "Low-level laser therapy does not aid the management of tennis elbow." Clinical rehabilitation 10.1 (1996): 9-11.
Assessment	**Continuous Assessment (50%):** 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 assessment covers 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