

MASTER'S FINAL STATE EXAM

Study program: Specialization in Health Care System
Study field: Physiotherapy

I. Theoretical exam: a) Human Biomechanics
b) Special and Developmental Kinesiology
c) Physical Medicine and Rehabilitation

II. Practical exam: Physiotherapy

I. THEORETICAL EXAM

A) Subject: HUMAN BIOMECHANICS

1. Mechanical properties of biomaterials.
2. Rheological models of biomaterials.
3. Viscoelastic properties of bone tissue.
4. Viscoelastic properties of cartilage.
5. Viscoelastic properties of ligaments and tendons.
6. Types of mechanic load of musculoskeletal system. Mechanisms of damage.
7. Biomechanics of muscle contraction.
8. Rheological model of muscle.
9. Hill's curve of muscle activity.
10. Biomechanics of muscular system.
11. Hydromechanical conditions during blood flow in small and big blood vessels.
12. Biomechanics of cardiac activity.
13. Biomechanics of respiratory system.
14. Joint mobility in view of biomechanics (mobility range, overall mobility, management aspects).
15. Axial system (biomechanical principles of function and structures).
16. Biomechanical characteristics of lower limb.
17. Biomechanics of walk (phases of a step, reaction force from a pad, kinematic description).
18. Biomechanical characteristics of upper limb; manipulation movements.
19. Application of statics for analysis of load of a locomotive system; inner forces.
20. Evaluation of a shape and principle of kinematic analysis of a locomotor system

ENOKA, R. M. Neuromechanics of human movement. Champaign: Human Kinetics, 2002. NIGG, B.M., HAMILL, J., KNUTZEN, K., M. Biomechanical basis of human movement. Lippincott Williams & Wilkins, 2006. KNUDSON, D., Fundamentals of biomechanics. Springer US, 2007. MACINTOSH, B. R., MESTER, J. Biomechanics and biology of movement. Champaign: Human Kinetics, 2000. NIGG, B., HERZOG, W. Biomechanics of the musculo-skeletal system. Wiley, 2007.

B) Subject: SPECIAL AND DEVELOPMENTS KINESIOLOGY

1. Clinical kinesiology and its importance in physiotherapy; its relation to other scientific fields. Importance of biomechanical and kinesiological aspects for analysis of spontaneous as well as directed movement of a human.
2. Axial organ and its functions in health and illness.
3. Limbs and their functions in health and illness
4. Functions of joints and their disturbances.
5. Functions of muscles and ligaments and their disturbances.
6. Importance of logistic function for movement.
7. Management of locomotor functions.
8. Sensory functions, nociception, perception and their relationship to movement behavior.
9. Neural and mechanical transmission of information in locomotor system; chaining of muscular functions.
10. Whole-body aspect of musculoskeletal system, certainty and stability of movement. Difference between local symptomatic and general causal approach.
11. Basic baseline positions of the body when relaxing; general and targeted readiness and their impact to the course of movement.
12. Process of movement control; impact of feedback and forward relation.
13. Movement control disturbances in clinical practice. Structural vs. so-called functional disturbances.
14. Postural and locomotion (rough) motor functions; skillful and locomotion (fine) motor functions.
15. Psychosomatics in physiotherapy. Relationship between state of mind and posture.
16. Analysis of locomotion disturbance: Procedure, assessment of range and nature of disturbances.
17. Early phases of child's ontogenesis and their developmental stages and possible disturbances.
18. Levels of postural strategies during the development of child. Movement skills in periods of childhood.
19. Primitive reflexology; developmental changes in motor function control.
20. Postural activity a testing of postural reactivity; differentiation of load-bearing areas and points in the development of verticalization.
21. Development of voluntary motor function; differentiation from holokinesis to ideokinesis.
22. Central disturbances of motor development; individual types of disturbances.
23. Relationship between postural function and respiratory movements and their use in practice.
24. Effect of permanently repeated stereotype positions and movements on posture and movement performance.
25. Motor function disorders in injuries and microinjuries.
26. Motor function disorders in intoxications, infections and allergies.
27. Motor function disorders in degenerations and involutions.
28. Motor function disorders in mental disorders.
29. Principles of procedures for change of defective mobility program achievement.
30. Use of kinesiology principles in sport and physical education.

CONNOLLY, K. J., FORSBERG, H. (eds.) Neurophysiology and Neuropsychology of Motor Development. London:Mac Keith Press, 1997.

HAIBACH, P. Motor learning and development. Champaign, IL: Human Kinetics, 2011.

LATASH, M. Neurophysiological Basis of Movement. Champaign: Human Kinetics, 1998.

LEWIT, K. Manipulative Therapy in Rehabilitation of the Locomotor System. 3rd edition. Butterworth Heinemann, 1999.

PIEK, J. P. Infant Motor Development. Human Kinetics, 2006.

SHUMWAY-COOK, A. & WOOLACOTT, M. H. Motor control: theory and practical applications. Baltimore: Williams, 1995.

SMITH, L. K., WEISS E. L. Brunnstrom's Clinical Kinesiology. F.A. Davis Company; 5th edition, 1996.

TRAVELL, J. G., SIMONS D. G. Myofascial pain and dysfunction. Vol I, II. Williams and Willkins, Baltimore-London, 1992.

C) Subject: PHYSICAL MEDICINE AND REHABILITATION

1. Health care system in the Czech Republic; legal regulation with regard to the work of physiotherapist. Medical rehabilitation system – structure, content, goals of individual subsystems and succession. Role of physiotherapy in prophylactic medicine.
2. Concept, content and theoretical principles of ergotherapy; use of this method and methodic procedures.
3. Physical treatment – division, types of procedures, nature, effects and carrying out of particular procedures; indications and contraindications.
4. Principles of pain influencing by means of physical therapy.
5. Use of physical therapy for muscle tone influencing.
6. Use of physical therapy for regeneration of tissues of posttraumatic etiology.
7. Use of physical therapy for influencing of locomotive system disorders.
8. Electrotherapy – therapeutic use of low-frequency currents, principle, types and effects of particular procedures, indications and contraindications.
9. Electrotherapy – therapeutic use of middle-frequency and high-frequency currents, principle, types and effects of particular procedures, indications and contraindications.
10. Mechanotherapy – types of procedures, principle, effects and performing of particular procedures, indications and contraindications.
11. Thermotherapy - types of procedures, principle, effects and performing of particular procedures, indications and contraindications.
12. Hydrotherapy - types of procedures, principle, effects and performing of particular procedures, indications and contraindications.
13. Phototherapy - types of procedures, principle, effects and performing of particular procedures, indications and contraindications.
14. Balneotherapy, climatic therapy, spa care – characteristics, principles, types, use, indications and contraindications of spa care, indication lists.
15. Scheme of diagnostic and therapeutic process in patients with vertebrogenic disorders.
16. Scheme of diagnostic and therapeutic process in patients with orthopedic diseases.
17. Scheme of diagnostic and therapeutic process in patients with internal and cancer diseases.
18. Scheme of diagnostic and therapeutic process in patients with neurological disease.
19. Scheme of diagnostic and therapeutic process in patients with psychiatric and/or psychosomatic problems.
20. Scheme of diagnostic and therapeutic process in pediatric patients with developmental coordination disorder.
21. Scheme of therapeutic process in patients with physical handicap.
22. Special physiotherapeutic concepts and methods.
23. Team work of physiotherapist and other specialists in health care system including legislation.
24. Instrumental examination methods used in physiotherapy.
25. Problems of load in selected types of illnesses from physiotherapist's point of view.

BRÜGGER, A. *Gesunde Körperhaltung im Alltag*. Brügger-Verlag, Zürich, 1998.

CARR, H. J., SHEPHERD, R. B. *Neurological rehabilitation*. Butterworth Heinemann, Oxford – Boston, 1998.

CASH's textbook of neurology for physiotherapists, Faber and Faber London, 1986.

EVERETT, T., KELL, C., *Human Movement: An Introductory Text*. Elsevier Health Sciences, London, 2011.

GOODMAN, C.C. *Differential Diagnosis for Physical Therapists: Screening for Referral*, 6th edition. Philadelphia, Elsevier, 2017.

HOUGLUM P. A., BERTOTI, D. B. *Brunnstrom's Clinical Kinesiology*. F. A. Davis Company: Pennsylvania, United States, 2012.

KENDAL, F. P., at all: *Muscles, testing and function with posture and pain*. Baltimore: Williams and Wilkins, 2005.

KOLAR, P. et all., *Clinical rehabilitation*. 1st edition. Prague: RPS, 2013.

LATASH, M. *Neurophysiological Basis of Movement*. Champaign: Human Kinetics, 1998.

LIEBENSON, C. *Rehabilitation of the Spine - A Practitioner's Manual*. Lippincott Williams & Wilkins, 2007.

LEWIT, K. *Manipulative Therapy in Rehabilitation of the Locomotor System*. 3rd edition. Butterworth Heinemann, 1999.

LOHR, J.B., WISNIEWSKI, A. *Movement disorders*. Gilford Press, London 1987.

MAY, B. J., LOCKARD, M. A. *Prosthetics & Orthotics in Clinical Practice: A Case Study Approach*, 1st edition. F. A. Davis Company: Pennsylvania, 2011.

MENSE, S., SIMMONDS, M., RUSSEL, J. Muscle pain. Lippincot, London 2001.

NORKIN, C C., WHITE, J., D. Measurement of joint motion : A Guide to Goniometry. Philadelphia: F.A.Davis, 1995.

O'SULLIVAN, S. B., SCHMITZ, T. J. Physical Rehabilitation, 6th Edition. F. A. Davis Company: Pennsylvania, 2013.

PAGE, P. et al. Assessment and Treatment of Muscle Imbalance: The Janda Approach. Champaign : Human Kinetics, 2010.

PALMER, M. L., EPLER, M: Fundamentals of Musculoskeletal Assessment Techniques (Spiral-bound). Baltimore. Lippincott Williams Wilkins, 1998.

PORTER, S. (Ed.). Tidy's Physiotherapy, 15th ed., Churchill Livingstone Elsevier, 2013.

PRENTICE, W. E. Therapeutic Modalities in Sports Medicine. St. Louis: Mosby, 1994.

REICHERTt, B., STELZNMUELLER, W. Palpaton Techniques: Surface Anatomy for Physical Therapists. Stuttgart: Thieme, 2011.

TRAVELL, J. G., SIMONS D. G. Myofascial pain and dysfunction. Vol I, II. Williams and Willkins, Baltimore-London, 1992.

WALSHE, E.G. Muscles, Masses & Motion. MacKeith Press, Oxford, 1992.

II. THEORETICAL EXAM

Subject: PHYSIOTHERAPY – practical part

Aim of the exam:

To prove ability of complex physiotherapeutic approach to a patient with given diagnosis in the range of practical skills and theoretical knowledge corresponding to the content of university, three-year (bachelor) and 2-year master study program as well as in the context of valid legislative in the Czech Republic.

Course of exam:

- 1) The student will receive patient's medical records for studying.
- 2) Preparation with the patient – approx. 30 minutes should be utilized for:
 - making assessment from physiotherapist's perspective including determination of differential analysis,
 - determination of assessment result,
 - formulation of treatment goals and formation of physiotherapeutic procedures originating from the assessment.
- 3) Exam – approx. 30 minutes and student will present:
 - differential analysis and results of assessment performed by student (conclusion of assessment),
 - proposal of therapy goals and physiotherapeutic procedures that will be applied in “today therapy unit”,
 - proposal of long-term plan,
 - if requested by the exam committee, the student will apply diagnostic and therapeutic procedures in the given patient.

Protocol of the examination:

- after completion of the final exam, the student will prepare the protocol documenting diagnosis of the patient, assessments performed by the student, proposal of therapeutic procedures (also long-term plan due to current situation),
- student will sign the protocol and submits it to the exam committee for filing into the Protocol on the Final State Exam.

Result of Practical Final State Exam:

The student will be informed about the result of the Practical Final State Exam in the term (time) that was announced by the committee prior to the initiation of preparation with a patient; in any case on the day of the exam (the practical part of the Final State Exam is meant)

Recommended literature:

Identical as for the subject “Physiotherapy – theoretical part”.