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| 1. Course title: Biomechanics | | | | | |
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| 2. Code: | | 3. Type (lecture, practice etc.): lecture | | | |
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| 4. Contact hours: 2 hoursper week | | 5. Number of credits (ECTS): 2 | | | |
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| 6. Preliminary conditions (max. 3): | | | | | |
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| 7. Announced:fall semester, spring semester, both | | | | | |
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| 8. Limit for participants: none | | | | | |
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| 10. Responsible teacher (faculty, institute and department):Dr**.** Mark Vaczi (Faculty of Sciences, Institute of Sport Sciences and Physical Education, Department of Theory and Practice of Sports) | | | | | |
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| 11. Teacher(s) and percentage: | | Dr. Mark Vaczi | | 100% | |
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| 12. Language:English | | | | | |
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| 13. Course objectives and/or learning outcomes:  In the course, students will be introduce to the interdisciplinary nature of biomechanics. Using previous knowledge in the fields of biology, anatomy, and physiology they will understand the laws and mechanisms responsible for human movement. Acquiring two major topics: principles of mechanics, and the neuromechanical basis of muscle, students will understand the background of muscular force production and forces acting on human body during physical activity. | | | | | |
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| 14. Course outline   1. Definition, development, importance, and application of biomechanics as an interdisciplinary science. Principles of motion. 2. Types of motions form mechanical aspects. Steady and unsteady motions. Straight and curved motions. 3. Definition of mechanics 1. Kinematical and dynamical parameters of motions. Displacement, time, and velocity. 4. Definition of mechanics 2. Velocity and acceleration. Kinematical parameters during rotary motions. Ways to measure kinematical parameters of motions. 5. Definition of free fall. Horizontal, vertical, and oblique trajectory. 6. Principles of dynamics. Force as a vector quantity. Newton’s laws and their applications in sport movements. 7. Definition of statics. Balance and stability. The leverage system in the human body. 8. Mechanical work, energy, power, pressure, and friction. Forces acting on human body in fluid. 9. Structure, function, and molecular contraction mechanism of skeletal muscle. The excitation-contraction coupling. 10. Muscle fiber and motor unit types. Motor unit recruitment principles. Electric activity and reflex mechanisms of muscle. 11. Mechanical aspects of skeletal muscle force production. Length-tension, force-velocity, torque, and elastic energy storage characteristics. 12. Skeletal muscle plasticity. Fatigue, microdamage, neural adaptation, hypertrophy, sarcopenia. 13. Laboratory tests in biomechanics. Dynamometry, force plate, EMG, motion analysis. | | | | | |
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| 15. Mid-semester works | | | | | |
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| 16. Course requirements and grading  Written exam is based on lectures, accessible electronic sources and lecture materials.  Grades:  50% Satisfactory  65% Average  80% Good  90% Excellent | | | | | |
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| 17. List of readings   1. McGinnis, PM: Biomechanics of Sport and Exercise. Human Kinetics, 2013. | | | | | |
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| 18. Recommended texts, further readings   1. Enoka, RM: Neuromechanical basis of human kinesiology. Human Kinetics, 1994. 2. Lieber RL. Skeletal Muscle Structure, Function, & Plasticity. Lippincott Williams & Wilkins, 2002. | | | | | |
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| **Date** | 13 April, 2017 | **Prepared by** |  | | |
| Dr. Mark Vaczi  responsible teacher | | |
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| **Endorsed by** | | |  | | |
| Dr. Mark Vaczi program supervisor | | |