<table>
<tr><td>Course code</td><td></td></tr>
<tr><td>Type and description</td><td>EC – elective subjects from the discipline of Mechanical Engineering</td></tr>
<tr><td>ECTS credit</td><td>1</td></tr>
<tr><td>Course name</td><td>Biomechanics I</td></tr>
<tr><td>Course name in Polish</td><td>Biomechanika I</td></tr>
<tr><td>Language of instruction</td><td>English</td></tr>
<tr><td>Course level</td><td>8 PRK</td></tr>
<tr><td>Course coordinator</td><td>dr Bartłomiej Zagrodny</td></tr>
<tr><td>Course instructors</td><td>dr Bartłomiej Zagrodny</td></tr>
<tr><td>Delivery methods and course duration</td><td>
<table>
<tr><th></th><th>Lecture</th><th>Tutorials</th><th>Laboratory</th><th>Project</th><th>Seminar</th><th>Other</th><th>Total of teaching hours during semester</th></tr>
<tr><td>Contact hours</td><td>0</td><td>0</td><td>0</td><td>5</td><td>0</td><td>0</td><td>5</td></tr>
<tr><td>E-learning</td><td>no</td><td>no</td><td>no</td><td>no</td><td>no</td><td>no</td><td>no</td></tr>
<tr><td>Assessment criteria (weightage)</td><td>0</td><td>0</td><td>0</td><td>100%</td><td>0</td><td>0</td><td>100%</td></tr>
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<tr><td>Course objective</td><td>Aim of the course is to provide the knowledge about:

1. Basics of biomechanics

2. Basic anatomical terminology in biomechanics

3. Choosen research and experimental methods

4. Basics of musculo-skeletal system mathematical modeling and examples of forces and torques calculations</td></tr>
<tr><td>Learning outcomes</td><td>After finishing the course, PhD student can:

1. Describing the basics phenomena connected with movement biomechanics, those, occured in musculo-skeletal system of living species, especcialy humans – outcome W1

2. Describing the theoretical basis of movement biomechanics - outcome W2

3. Planning, performing and interpreting the results of experiments, examination of hypotheses – outcomes U1, U2, U3, U4

4. To present the results and preform irs critical discussion – outcomes K1, K2, K3</td></tr>
<tr><td>Assessment methods</td><td>W1, W2 – presentation connected witch a choosen topic

U1, U2, U3 - raport of a planned and performed experiment

U4, K1, K2, K3 – preparation of the experiment description and its instruction

Final note calculation</td></tr>
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	Presentation of the choosen topic – 20% Preparation of the experiment description and its instruction – 20% Raport from a project – 60%
Prerequisites	None
Course content with delivery methods	Theoretical backround 1. Biomechanics and its meaning, research methods, usefulness, examples of complementarity of biological and technical sciences, biomechanics of sport, medical and rehabilitation biomechanics, general biomechanics 2. Basics of anatomy and physiology, the most important nomenclature 3. Exemplary engineering research methods used in observations of living organisms, examples of problems encountered in experiments and interpretation of results 4. Examples of mathematical modeling of movement, necessary simplifications, examples of calculations of forces and moments operating in the human motion system 5. Movement and locomotion - theoretical foundaments and practical examples Practical part 1. Thermal imaging and electromyography in the assessment of the human musculoskeletal system functioning 2. Analysis of human locomotion on the example fo gait with use of Motion capture systems and force platforms 3. Variability of results obtained during the study of biological systems - an example of the problem of planning and conducting experiments on living systems Skills should be acquired during the scientific project performed s a form of the subject
Basic reference materials	1. Lecturer's material, 2. D. Knudson, Fundamentals of Biomechanics, Springer, New York 2007 3. D. Levine et al., Whittle's Gait Analysis, Churchil Livingstone 5. ed. Elsevier Uraban&Partner, Wrocław 2012 4. Scientific publications
Other reference materials	1. Ch.L. Voughan et al. Dynamics of Human Gait, Kiboho Publishers, Cape Town, 1992 2. R. Bartlett, Introduction to Sports Biomechanics, Routledge Taylor&Francis, London, 2007
Average student workload outside classroom	15h
Comments	Classes conducted using flipped education, case teaching and problem based learning methods
Last update	July 2020