

## **Doctoral School on Safety and Security Sciences – Óbuda University**

**Course title:** Mathematical tools of motion analyses in biomechanics

To which area the course belongs: **Applied research**

**Credit value of the course:** 6 credits

**Lecturer:** István Bíró

### **The aim of the course:**

The aim of the course is the deeper understanding of the biomechanics of human motion in sports and rehabilitation. During the investigation of different human motion, processing of a large number of kinematical data is necessary. Different type of motion capture systems, equipments and methods such as optical, electromagnetic and image-based techniques can be applied. For deeper investigation, the processing of measured data is necessary to calculate various special kinematic and kinetic parameters. In these cases the application of special mathematical tools are indispensable.

**Prerequisite:** -

### **Content of the course:**

Review and analytical evaluation of different mathematical tools can be applied motion analysis. The 2<sup>nd</sup> part of the content of the course is the application of some reviewed and evaluated mathematical tools in own research topic.

### **Recommended reading:**

Iwan W. Griffiths: Principles of biomechanics & motion analysis. Lippincott Williams & Wilkins, 2006, ISBN 0-7817-5231-0, 2006

Bíró István, Fekete Gusztáv: Approximate Method for Determining the Axis of Finite Rotation of Human Knee Joint, ACTA POLYTECHNICA HUNGARICA 11:(9) pp. 61-74. (2014)

G Fekete, B M Csizmadia, M A Wahab, P Baets, L Vanegas-Useche, I Biro: Patellofemoral Model of the Knee Joint Under Nonstandard Squatting, DYNA-COLOMBIA 81:(183) pp. 60-67. (2014)

István Bíró, Béla M. Csizmadia, Gábor Katona: Sensitivity investigation of three-cylinder model of human knee joint, BIOMECHANICA HUNGARICA 3:(1) pp. 33-42. (2010)