

# **The basics of musculoskeletal modelling and simulation using OpenSim**

A Blended Intensive Program (BIP) in Biomechanics

**Location: Hungarian University of Sports Science Campus (42-48 Alkotás utca, 1123 Budapest, Hungary)**

**Date: 9-13 October 2023**

## **WELCOME!**

Welcome to our BIP in Biomechanics at the Hungarian University of Sports Science (HUSS). This document contains important information regarding your stay in Hungary for the 5-day-long course. Please, read this information carefully.

## **REQUIRED TASK BY 25 SEPTEMBER**

To allow us arrange your participation in the course, we ask you to **fill in** a short form (1 min) **by 25 September** that you can access by clicking [HERE](#) or by scanning the QR code below.



Form to register for the OpenSim BIP



## **ARRIVAL AND DEPARTURE**

Your on-site classes will begin on Monday, 9 October 2023 at 12:00 and will end on Friday, 13 October at 12:15. Please, make travel arrangements accordingly. Feel free to contact us in case you have difficulties in arranging your travel to Budapest.

To reach the city from the airport, you have several options. You can take bus 100E directly to the centre or take 200E and transfer to metro line M3 (blue) to reach the city centre, or take a taxi.

## **ACCOMMODATION**

We ask you to arrange your own accommodation for the duration of your visit. If you have not yet planned, you can explore the following reliable websites to search for a place to stay:

<https://www.booking.com/>

<https://revngo.com/>

<https://www.trivago.hu/>

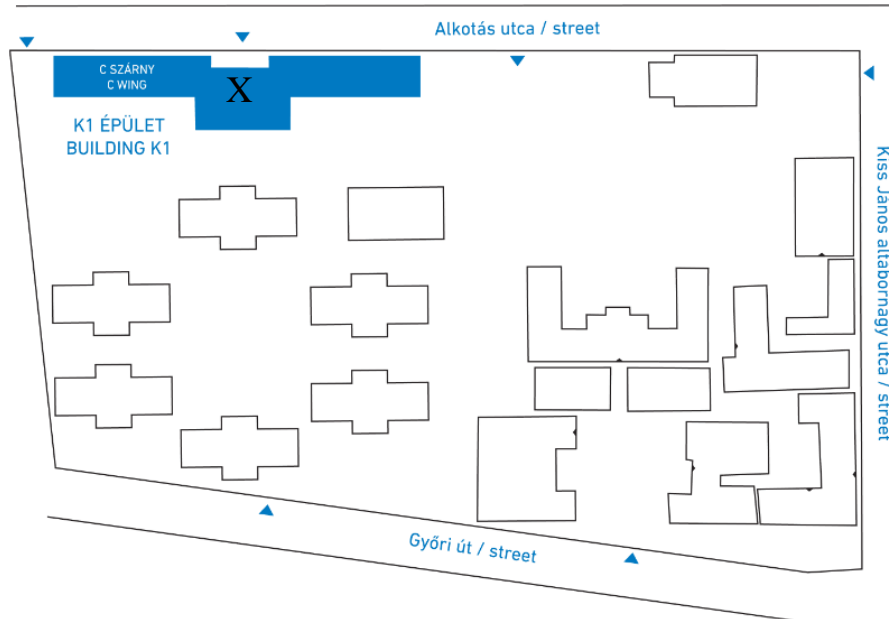
## **ADDRESS OF THE VENUE**



1123 Budapest, 42-48. Alkotás street  
(scan QR code)

Your classes will be held on the HUSS Campus in Building K1 (marked by X on the map below). The first day starts with a get-together lunch so we will meet at the reception of Building K1 (ground floor) and walk together to the cafeteria at 12:00. Then, we walk together to classroom C001, the location of the OpenSim BIP classes.





Schematic map of the Hungarian University of Sports Science (HUSS). The meeting point of the first day is marked with **X**.

## OPENSIM BIP SCHEDULE

The course will take place on the HUSS campus, Budapest, Hungary. Ass. Prof. Hans Kainz and Dr. Basilio Gonçalves, University of Vienna, Austria, will teach the course over five consecutive days on campus. One online meeting will follow. The course will cover the following topics:

9 Monday	14:00-17:15	Introduction to rigid body and muscle-tendon modelling
10 Tuesday	09:00-12:15	Model personalization, estimation of joint angles and external joint moments
11 Wednesday	15:00-18:15	Estimation of muscle and joint contact forces
12 Thursday	09:00-12:15	Simulation of the effects of musculoskeletal alterations on muscle and joint loads
13 Friday	09:00-12:15	Summary and future directions
Date TBA		Online Q&A



## USING YOUR OWN LAPTOP OR HUSS PC

We encourage you to use your own laptop during the course. In this case, please pre-install the following on your laptop before your travel:

- OpenSim 4.4 (need a login account to download)
  - [Windows](#)
  - Mac
- Notepad ++
- [Mokka](#)
- Excel or equivalent
- [Python 3.8](#) (optional)
- [Git](#) (optional)
- [VScode](#) (optional)

Alternatively, we can provide a pre-installed PC for the course. However, in this case you need to inform us on the OpenSim BIP registration form.

## MEALS

On Monday, 9 October 2023 you will receive a Welcome Lunch at 12:00, before classes start in the Private Room at the rear of the HUSS cafeteria. You will receive a Farewell Lunch on Friday at 12:15 in the same room.

## SOCIAL PROGRAMS

*Monday, 9 October:* On your first day, you will have the opportunity to walk around Budapest with an experienced tour guide who is also a biomechanics PhD student at HUSS. You will have time to drop off your laptop and backpack at your accommodation, and we will keep you posted about the exact time and place to meet for the tour.

*Tuesday, 10 October:* We go together to the Museum of Fine Arts. We meet at the reception of Building K1 at 13:30. After the Museum, we encourage you to visit the nearby Széchenyi Thermal Bath as a facultative program at your own costs (swimsuits needed).

*Thursday, 12 October:* After classes, we visit the House of Music, Hungary (Magyar Zene Háza). We go there together from the University in the afternoon. More information to follow on site.

**Top sights in Budapest you can explore on your own (related costs are not covered):**

- Castle area and views from Fishermen's Bastion over the Danube and the Parliament
- National Gallery in the Castle area
- Saint Matthias Church in the Castle area
- Saint Stephen's Dome on the Pest side
- Heroes Square
- Danube cruise using public transportation: <https://bkk.hu/en/travel-information/public-transport/boat-services/>
- Rent a bike to ride along the Danube (Buda side) and Margaret Island (Margit-sziget)
- Spas: Széchenyi Thermal Bath or Rudas Thermal Spa

**SCIENTIFIC SYMPOSIUM ON BIOMECHANICS**

On Wednesday 11 October 2023 from 8:00 am to 14:30 pm, the Department of Kinesiology, HUSS will organize a scientific symposium entitled 'Biomechanics in Sports and Ageing'. The venue of the symposium will be on HUSS Campus, close to the OpenSim course venue.

You can find the programme and exact location of the symposium at the end of the current document.

You can attend the event free of charge, however, **pre-registration via an online form is required by 25 September**. To achieve the form and register, click [HERE](#), or scan the QR code. Please, fill the form only once. Note, that this form is different from the BIP registration form.



## **WEATHER**

You can expect the weather to be mild, enjoyable, possibly rainy in Budapest in October. The average temperature is around 16°C with afternoon highs of 19°C. At night, the weather is expected to be cooler, with lows around 7°C.

## **PUBLIC TRANSPORT**

Budapest has a convenient and extensive public transportation system, making it easy to reach all corners of the city by metro, tram, bus, trolley, train and suburban (green) railway lines. Valid passes or tickets are required for travel which you can buy at BKK Ticket Offices, BKK Ticket Vending Machines and on your phone in the BudapestGo or Simple applications. Public transportation operates with frequent services and there are night buses available during late-night hours.

<https://bkk.hu/en/>

## **CURRENCY**

The official currency in Hungary is the Hungarian Forint (HUF). Currency exchange services are widely available in Budapest, but it is advisable to compare exchange rates and fees before making any transactions. Credit and debit cards are widely accepted; however, it is always a good idea to carry some cash. ATMs are located throughout the city, allowing you to withdraw Hungarian Forints directly from your bank account.

## **COMMUNICATION DURING THE EVENT**

We created a WhatsApp group to share information during your stay in Budapest, which you can join by clicking [HERE](#) or by scanning the QR code.



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## **CONTACT US**

### **Dr Annamária Péter**

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Kinesiology

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# SCIENTIFIC SYMPOSIUM: BIOMECHANICS IN SPORTS AND AGEING

11 OCTOBER  
2023  
8:00–14:30

**Organiser:** Department of Kinesiology, Hungarian University of Sports Science (HUSS)

**Location:** Dr. Koltai Jenő Sportközpont, HUSS (2–10 Csörsz utca, 1123 Budapest)

**Date:** 11 October 2023

**Chair:** Professor Emeritus József Tihanyi (HUSS)

**Co-chairs:** András Hegyi (HUSS), Annamária Péter (HUSS)

## MORNING PROGRAMME

8:00–8:30 Registration

8:30–8:35 Opening

Professor Zsolt Radák, Vice-Rector for Scientific and Innovation Affairs (HUSS, Hungary)

8:35–9:00 Biomechanics of the Achilles tendon

Professor Toni Arndt (Swedish School of Sport and Health Sciences, Sweden)

9:00–9:25 High-density surface electromyography provides accurate estimates of muscle excitation

Asst. Professor Taian Martins Vieira (Politecnico di Torino, Italy)

9:25–9:50 Gait biomechanics in ageing

Professor Tibor Hortobágyi (HUSS, Hungary)



- 9:50–10:15 Exploring gait dynamics through Mobile Brain/Body Imaging  
Ass. Professor Uroš Marušič (Institute for Kinesiology Research, Slovenia)
- 10:15–10:45 Coffee break
- 10:45–11:15 Keynote presentation honouring the 50th anniversary of the International Society of Biomechanics: Biomechanics of advanced footwear technology  
Professor Toni Arndt (Swedish School of Sport and Health Sciences, Sweden)
- 11:15–11:45 Roundtable discussion on the future of biomechanics in sports and exercise science

### **AFTERNOON PROGRAMME**

- 13:00–14:30 Demonstration: the use of high-density EMG in high-speed movements  
Asst. Professors Taian Martins Vieira & András Hegyi



**HUNGARIAN UNIVERSITY  
OF SPORTS SCIENCE**

BUDAPEST