	U-LAS40 10012 LE26			
< >	Structures and Mechanisms of Human Movement-E2 Structures and Mechanisms of Human Movement-E2			PATAKY Todd
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This course will consider how humans move and how human movements can be scientifically described. Key anatomical structures (bones and muscles) will be reviewed, along with the anatomical terminology needed to describe movement. Basic mechanical principles will be used to describe how our bodies interact with the environment. Students will also learn computer techniques for processing and displaying human motion data. Open-source software tools (Jupyter and Blender) will be used to emphasize concepts and conduct analyses.

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This course provides an understanding of the biomechanical concepts and computer methods needed to objectively describe human movement. Key biomechanics concepts include: functional anatomy, forward and inverse kinematics. Computer methods include: motion capture data processing, 3D data display and animation, and data extraction for figure generation. Through programming-based assignments students will incrementally learn how to apply these concepts to descriptions of real-world human movement data. As a Final Project, students will comprehensively compare two, similar movement types, using the biomechanical and computer skills learned in this course.

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Over this 14-class lecture, the following topics will be covered:

1) Anatomy I: Body Segments, Joints and Muscles
2) Anatomy II: Directions and Movements
3) Dynamics I: Linear 1D Movement
4) Dynamics II: 2D & 3D Movement
5) Dynamics III: 3D Movement
6) Motion Capture I: Introduction
7) Motion Capture II: Exploring Human Kinematics
8) Motion Capture III: Describing Human Kinematics
9) Motion Capture IV: Graphing Human Kinematics
10) Kinematic Chains I: Forward Kinematics
11) Kinematic Chains II: Inverse Kinematics
12) Final Project Work Session I: Creating Figures
13) Final Project Work Session II: Segmentation
14) Final Project Work Session III: Figure Interpretation
15) Feedback

Total: 14 classes, 1 Feedback session

Structures and Mechanisms of Human Movement-E2(2)

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There are no specific requirements for this class. However, experience in computer programming, physics and mathematics may help you to learn concepts more quickly.

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Students are expected to complete regular assignments. Evaluation will be based on the following criteria:

- Assignments (63%) [9 Assignments @ 7% each]
- Final Project (37%)

TOTAL: 100%

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An open, electronic textbook called "Introduction To Human Biomechanics" will be distributed electronically to students and will be used in most classes. All additional materials will also be distributed electronically and will be discussed in class.

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A variety of links to relevant websites will be provided in the lecture notes. Students are also encouraged to search for additional relevant internet sites to supplement learning.

https://jupyter.org(The Jupyter platform will be used for all lecture notes and assignments. No experience is required.)
https://www.blender.org(Blender will be used for 2D and 3D human movement visualizations.)

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This course has a number of out-of-class assignments and a final project. There is no exam. Students who do not pay attention to the lecture content during class will likely have difficulties completing the assignments.

All lecture content will be made available online prior to the lecture. It is recommended that students review this content prior to the lecture.

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OFFICE HOURS:
    Immediately before/after lecture or by appointment (pataky.todd.2m @ kyoto-u.ac.jp)

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