

Putting one foot in front of the other: Understanding the mechanics of walking using physics and math

**Anne Martin and Daniel Williams (Department of Mechanical Engineering)
Matt Johnson (Center for Science and the Schools)**

**Thursday, February 6, 2020 (9:00 a.m. – 3:00 p.m.)
202 Hammond Building, Penn State**

Most humans learn to walk within the first year of their lives. But keeping your balance relies on a series of coordinated and complicated movements that is not fully understood. In order to better understand complex movements, engineers model humans by applying their knowledge of mechanics, center of mass, and other factors. Through an enhanced understanding of “normal” motion, engineers can better predict the risk factors involved in falling and design robots that mimic human locomotion. All teachers are welcome, but content is most applicable to physics, general science, math and computer science teachers, particularly those teaching about forces, motion, center of mass, and data analysis.

Target Audience: Teachers of students grades 6-12

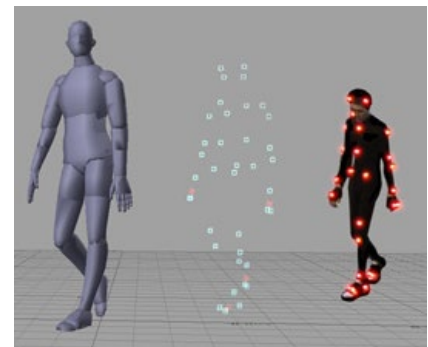
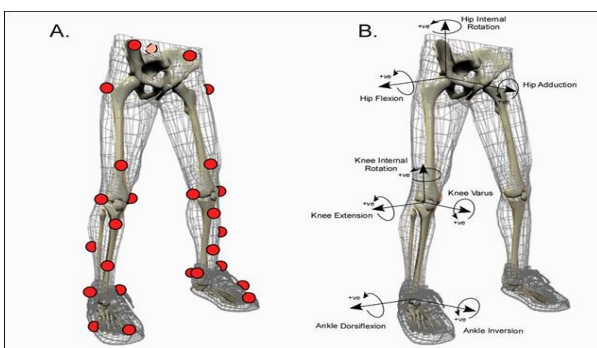
This workshop is FREE to all educators with ACT 48 (6 hours) provided free of charge and aligns with the PA Science and Technology standards, and Next Generation Science standards.

A continental breakfast and lunch are provided.

**Maximum enrollment is 24. [Register online now](#) to reserve a spot online today.
For more information email Matt Johnson at mjohnson@psu.edu or call 814-863-6607.**

Sponsored by:

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Pennsylvania Science, Technology, and Engineering Standards

Standard - 3.2.10.B1

Analyze the relationships among the net forces acting on a body, the mass of the body, and the resulting acceleration using Newton's Second Law of Motion.
Apply Newton's Law of Universal Gravitation to the forces between two objects.
Use Newton's Third Law to explain forces as interactions between bodies.
Describe how interactions between objects conserve momentum.

Standard - 3.2.12.B6

Compare and contrast motions of objects using forces and conservation laws.

Common Core Math Standards

Grades 6-12

CC.2.2.6.B.3: Represent and analyze quantitative relationships between dependent and independent variables.

CC.2.2.7.B.3: Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.

CC.2.2.8.B.2: Understand the connections between proportional relationships, lines, and linear equations.

CC.2.4.6.B.1: Analyze and/or interpret bivariate data displayed in multiple representations.

CC.2.1.HS.F.3: Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.

CC.2.1.HS.F.5: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

CC.2.2.HS.D.7: Create and graph equations or inequalities to describe numbers or relationships

CC.2.4.HS.B.2: Summarize, represent, and interpret data on two categorical and quantitative variables.

Computer Science Standards

Grades 6-12

2.CS.02: Design projects that combine hardware and software components to collect and exchange data.

2.DA.08: Collect data using computational tools and transform the data to make it more useful and reliable.

3A.DA.12: Create computational models that represent the relationships among different elements of data collected from a phenomenon or process.

3B.DA.05: Use data analysis tools and techniques to identify patterns in data representing complex systems

3B.DA.06: Select data collection tools and techniques to generate data sets that support a claim or communicate information.