**2015 American Association of Physics Teachers (Iowa Section) Meeting**

**Saturday Nov. 7** (8:30 AM - 4:00 PM)

**Central Academy (Des Moines) - local host Sara Karbeling** (skarbeling@gmail.com)

**8:30 - 9:00 AM** -- Registration (**$7**), coffee, donuts

**9:00 - 9:45 AM** -- Welcome, opening remarks, comments from section representative and members who attended the AAPT National Meeting in College Park (August 2015), Door Prizes

**9:45 - 10:00 AM -**- Break

**10:00 AM - Noon** -- Invited Speakers (10 minutes each with 5 minutes for questions, while we start setting up for the next speaker)

*“Not Your Average Lab: Using WebAssign’s Custom Lab Solutions in the Undergraduate Physics Laboratory” --*

Tuafiki Lee - WebAssign

WebAssign, the online homework and assessment system of choice for introductory physics, offers solutions for the introductory laboratory that provide immediate feedback to students for pre-lab, in-lab, and post-lab activities. Our solutions can be designed to work with your existing experiments and lab materials to create a custom lab experience. We also offer “out-of-the-box” solutions, available for direct adoption or partial customization, for both the algebra-based and calculus-based physics course. Using WebAssign for your lab can help decrease student cost, provide immediate guidance and feedback to your students, connect concepts from lab to lecture, and standardize grading across multiple lab sections.

*“Physics and STEM Updates from ECC” --* Ben Rislow - Ellsworth Community College, Iowa Falls

My name is Ben Rislow and I am in my second year of teaching physics and math at Ellsworth Community College in Iowa Falls.  I will provide updates on ECC’s physics courses and STEM initiatives.  The physics courses I teach are Classical Physics I and II, Survey of Physics, and Principles of Astronomy.  We recently established a STEM club and a summer STEM camp for elementary and high school students.  Being a relatively new teacher, I look forward to comments and suggestions from my teaching colleagues.

*“Centripetal Force Demo”* -- Bill Cox - Dowling HS, Des Moines (retired)

Spice up your class with demos. Involve students. Remember the textbook diagram with swinging a bucket of water over your head – doing is better than looking at a picture and it creates a teachable moment. This simple homemade centripetal force apparatus works and is almost student-proof. It connects theory and diagrams to reality – Physics works!

*“Introducing Computer Programming into a Projectile Motion Lab” --*

Dr. Susa H. Stonedahl (presenting), Caleb Reiter - St. Ambrose University, Davenport, IA

Dr. Forrest Stonedahl- Augustana College, Rock Island, IL

Understanding what computers can do for us has become an important part of our world. Computers can save us time and allow us to calculate things that were impossible a few decades ago. However many students reach college and even graduate without any idea how to harness their power. I have experienced multiple instances of intelligent undergraduate research students wasting many hours manually doing something that could (and should) have been completed with a simple for-loop. While we cannot teach introduction to computer science within physics class, we can make students a little less afraid of programming and a little more aware of what computers can do by incorporating some programming concepts into our classes. I plan to present a portion of a projectile motion lab, which introduces students to a short program, arrays, and a for-loop. In this program they plot the location of a projectile at a sequence of times, read the maximum height, maximum horizontal displacement from the graph and use kinematics to derive these values. Versions of the programs are freely available on-line written in MATLAB and Python (free) along with an accompanying handout.

*“Adding Flavor to One-Dimensional Motion with Glowscript” --* Nathan Quarderer - Northeast Iowa Community College, Calmar

*A train traveling west at 20 mph leaves the station in West Union at noon. On the same set of tracks, another train traveling east at 15 mph leaves East Village (located 100 miles due west of West Union) at 1:00 PM. When and where do these two trains collide?* This traditional textbook problem can be easily turned into an engaging, hands-on activity, which I have further adapted to include a layer of computational modeling using the web-based 3D environment *Glowscript* ([http://www.glowscript.org](http://www.glowscript.org/)).

*"Viscous Fluid Motion in a Horizontally Rotating Cylinder" --* Kolter Bradshaw and Zach Van Engen - Dordt College, Sioux Center

If you race a hoop and a disk of equal mass and radius by rolling them down a ramp, the disk will reach the bottom first due to the difference in how the mass is distributed. For rolling solid objects, this phenomenon is straightforward to model. However, if you roll a hollow cylinder filled with fluid, the situation is more complex due to the way fluid properties, such as viscosity, effect rotation. We are analyzing the motion of fluids and beads in a cylinder in order to observe viscosity effects on the fluid-cylinder system. By examining a rolling fluid-cylinder system containing various fluids and amounts, we find significant variations in the motion.

*"Systematic Errors in Intro Lab Video Analysis" --* John Zwart, Kayt Frisch, Tim Martin - Dordt College, Sioux Center

In video analysis lab experiments, students frequently find large discrepancies between results based on self-filmed videos and expected values (e.g. for g determined by a fit to projectile motion data).  These differences are frequently far larger than the uncertainty calculated from their fit. Using an inexpensive point-and-shoot camera with a 4x optical zoom to record video, we investigated two possible causes of this error: the effect of placing the reference meter stick at a different object-to-camera distance and the effect of the motion of interest being in a plane not perpendicular to the camera lens. When we observed these phenomena for wide angle, normal, and telephoto focal length settings we found systematic errors as large as 40%.   Based on our findings, we make recommendations for minimizing these errors.

*“Flexing Our Physics Muscles: Teaching students about models in physics” --* Dr. Steve Hart - Mercy Colleges of Health Sciences, Des Moines

When teaching the concept of equilibrium in my physics 101 classroom, one scenario that receives extra scrutiny is the biceps curl. My students study the effect that the angle of the forearm has on the tension in the biceps muscle using both mathematical and physical models. Because the different models yield different results, my students must assess what makes a model a ‘good model’. In my presentation I will describe the scenario we discuss in detail, the objectives of the activity, and some of my observations from past experiences.

**12:00 - 1:00 PM** -- Break for Lunch - Pizza will be delivered to us! Have a look at the menu to get an idea of what you’d like to eat (<http://gustopizzaco.com/#/id/i10258046>). Individual orders available. You will be responsible for covering your own costs for lunch. We can order as a group and figure out what individual costs will be on the day of the meeting.

**1:00 - 1:30 PM** -- Keynote Address

*“Encouraging Young Women in the Physical Sciences” --* Kristen A. Thompson – Loras College, Dubuque

Women continue to be under-represented in the physical sciences despite decades of efforts to reverse this trend. This continues while other fields, including medicine, have been successful in recruiting near equal numbers of women and men. Research suggests that young women choose other fields due to cultural stereotypes, lack of support, their own perception of their ability, and a desire to pursue an altruistic career. There are research-based strategies that can be used to reverse this trend.

**1:30 - 1:45 PM** -- Break

**1:45 - 2:45 PM** -- Committee Meeting, Door Prizes, “What Is This” identification session. (Bring a piece of apparatus from your back room or corner closet and see if you can stump the experts who will try to identify it).

 **2:45 - 3:00 PM** -- Break

**3:00 - 4:00 PM** -- Workshop

*“Using Arduino” --* Kristen A. Thompson - Loras College, Dubuque

Arduinos are inexpensive and compact microcontrollers. Due to their simplicity and low cost, Arduinos have become popular for a wide variety of applications, including design projects and data acquisition. Their popularity has created a community supporting development of a wide variety of compatible sensors and peripherals.  This workshop will be for teachers interested in learning some of the basics of how to use Arduinos.

**4:00 PM** -- Go home! :)