American Association of Physics Teachers
Southern Atlantic Coast Section

Spring 2007 Meeting
March 23-24, 2007

Armstrong Atlantic State University
Savannah, GA

Friday, March 23
Registration: 6:00 PM - 7:00 PM

Keynote Address
7:00 PM – Science Center room 1407

The Student-Centered Activities for Large Enrollment Undergraduate Programs (SCALE-UP) Project

Robert J. Beichner, Professor of Physics, North Carolina State University

How do you keep a classroom of 100 undergraduates actively learning? Can students practice communication and teamwork skills in a large class? How do you boost the performance of underrepresented groups? The Student-Centered Activities for Large Enrollment Undergraduate Programs (SCALE-UP) Project has addressed these concerns. Materials developed by the project are now in use by more than 1/3 of all science, math, and engineering majors nationwide. Physics and chemistry classes are currently in operation, with biology, engineering, and oceanography adaptations in progress.

Educational research indicates that students should collaborate on interesting tasks and be deeply involved with the material they are studying. We promote active learning in a redesigned classroom for 100 students or more. (Of course, smaller classes can also benefit.) Classtime is spent primarily on “tangibles” and “ponderables”—hands-on activities, simulations, and interesting questions. There are also hypothesis-driven labs. Nine students sit in three teams at round tables. Instructors circulate and engage in Socratic dialogues. The setting looks like a banquet hall, with lively interactions nearly all the time.

Hundreds of hours of classroom video and audio recordings, transcripts of numerous interviews and focus groups, data from conceptual learning assessments (using widely-recognized instruments in a pretest/posttest protocol), and collected portfolios of student work are part of our rigorous assessment effort. We have data comparing 16,000+ students. Our findings can be summarized as the following:

Ability to solve problems is improved
Conceptual understanding is increased
Attitudes are improved
Failure rates are drastically reduced, especially for women and minorities
Performance in later courses is enhanced

In this talk I will discuss the classroom environment, describe some of the activities, and review the findings of studies of learning in various SCALE-UP settings.

Saturday, March 24

Registration: 8:00 am - 9:00 am

Schedule and Abstracts of Contributed Talks and Workshops – SCIENCE CENTER 1407

9:00 am
Using Web Based Simulations for Physics Classroom Activities
J.B. Sharma, Gainesville State College, jsharma@gsc.edu

In recent years, a large collection of interactive simulations have become available on the Web for use in physics teaching/learning. Many of these simulations are available free of cost and can be easily integrated into physics courses at the high school and college level courses. The judicious use of simulations in the physics classroom can be a powerful enhancer of conceptual learning and scientific visualization. The use of simulations for classroom and 'virtual' laboratory activities will be discussed along with specific examples. Physics educational research affirms the significant value added in physics teaching/learning by simulations and a case will be made for their greater use in the curriculum.

9:20 am
DC Circuits: A Case for Modeling
Ntungwa Maasha, PhD, Coastal Georgia Community College, maasha@cgcc.edu

Over the last three years students in both the algebra-based and calculus-based courses were successful in completing laboratory exercises on DC circuits from which they deduced circuit laws with a minimum of assistance beyond the laboratory manual. This is in stack contrast to the other laboratory exercises. The presentation examines some possible reasons for this difference.

9:40 am
The Classroom in Transition: Intermediate Results from Georgia Southern University.
Cleon E. Dean, Physics Department, P.O.B. 8031, Ga. Southern University, Statesboro, GA 30460-8031. cdean@GeorgiaSouthern.edu

The physics classroom is in transition at Georgia Southern University. The Physics Department is in the process of transforming its classrooms to the Studio Physics model. One model classroom, capable of serving up to 48 students at once, has already been converted at some expense and is already in use. Because of budget restraints and construction time considerations it is estimated that full conversion of all physics classrooms will not take place until 2010. In the meantime, the majority of the classrooms remain in the traditional format. A hybrid method, intermediate to the full Studio Physics model, is presented that brings interactive engagement to the traditional classroom. This method uses an overhead projector, transparencies, a laptop hooked up to a radio transceiver, student response clickers, and web-based homework system to implement Peer Instruction with Just in Time Teaching.

10:00 am
Implementing Studio Physics at Georgia Southern University
Mark Edwards, Physics Department, P.O.B. 8031, Ga. Southern University, Statesboro, GA 30460-8031. edwards@georgiasouthern.edu

The Physics Department at Georgia Southern University has begun to offer its introductory physics classes in a combined lecture/lab format that is called "Studio Physics". This format has been implemented without adding any new classes to the curriculum. The combined format has been achieved mainly through administrative initiatives including introducing "linked" classes at registration, assigning the same instructor to this linked pair of classes, and, most importantly, holding the lecture and laboratory in the same teaching space. I will contrast this new format with our traditional lecture and laboratory introductory physics classes. I will also outline how assessment is built in to the new model and how it has become a research testbed for a Physics Education Research group recently established in our department. Finally, I will comment on how this new initiative has enhanced the vitality of introductory physics teaching at GSU and its influence across the campus.

10:20 am
Associative Thinking and Imagination: *Studying and teaching Introductory Physics*
Mikhail M. Agrest, Ph. D, College of Charleston, Charleston. SC (843) 953-1359 AgrestM@cofc.edu

Scientists study unknown laws of the Universe; students learn what scientists already discovered. Nevertheless, there is a lot in common in the process of acquiring new knowledge in these two different studies. While associative thinking and imagination are effective tools in creating Physical models in the first, they are also essential in relating new knowledge to previously obtained information. The storytelling techniques were utilized[1-4] at the College of Charleston to employ the teacher-student communication and relationship and to make the emotional component of the cognition process effective and motivating.
Positive feedback was received from students and faculty at the College and some other Universities.

1-2. M. Agrest. Lectures on Introductory Physics I & II. ***Revised*;** ISBN 1426625596 & 0-759-39304-4 Thomson Learning , 2007& 2006,
3-4. M. Agrest. Lectures on General Physics I&II (Calculus Based) ISBN 0-759-35047-7 & 0-759-36060-X; 256 &237 pp with illustrations Thomson Learning , 2005.

10:40 am
From Units to Understanding
Louis E. Keiner, Coastal Carolina University, Conway, SC 29528, 843.349.2226
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All of us tell our students to watch their units when they are working problems. Why are units so important? To many students, units simply serve as a form of algebra check. But if that is where we leave it, we have missed an opportunity for increasing our students understanding of physics. Units, of course, describe the variable that you are measuring, giving a physical meaning to a number. This physical meaning is something that we are always telling students that we want them to understand. Having students analyze units can bring them to a higher-order understanding of the physical process in question. Units can be the connection between equations, graphs, experience and understanding. This presentation will give examples of several common units whose meaning students often never see - meaning that will help them move from memorization to comprehension to successful analysis and problem-solving.

11:00 am
Changes in the higher ed curriculum for education majors
Donna Mullenax, Armstrong Atlantic State University, mullendo@mail.armstrong.edu

PRISM (Partnerships for Reform in Science and Mathematics) has been in place for four years in Georgia. This NSF initiative focuses on building relationships between K-12 and higher ed. STEM faculty with goals of improving math and science learning among students. There have been many aspects of PRISM in which I have been involved, but recently I have started to work with the College of Education at AASU to look at how we prepare future teachers. The outcome of these discussions will be presented. I will also share where education training programs are heading in Georgia with regard to science content.

11:30 am – 1:15 pm Lunch and Business Meeting – Faculty Dining Room, MCC Building

WORKSHOPS
1:30 – 3:30 pm

Science Center 2016
WEB-BASED INTERACTIVE ACTIVITIES FOR TEACHING AND LEARNING PHYSICS TOPICS
Taha Mzoughi, Kennesaw State University
John T. Foley, Mississippi State University

WebTOP, PhysLets, and other online resources can be used to supplement and enhance lectures, laboratory, and homework. The simulations can be used both as additional visual learning aids and as a vehicle for interactive, inquiry based, guided tutorials. The workshop will enable participants to explore various examples of such use. In particular, they will be able to explore the resources used at Kennesaw State University for teaching introductory physics and physical science courses and to learn how to set up and use WebTOP and its associated tutorials. Topics that may be covered include forces and motion, 2D motion, waves, geometrical optics, reflection and refraction, polarization, interference, diffraction, lasers, photoelectric effect, and scattering. This work is sponsored in part by the National Science Foundation (DUE 0231217).

Science Center 2308
GEOSPATIAL TECHNOLOGY IN THE MECHANICS CLASSROOM
J.B. Sharma, Gainesville State College, jsharma@gsc.edu

Geospatial technology allows students to both visualize and analyze real-world motion. Students can collect their 3-D time varying position vector using a GPS unit. With the knowledge of the mass of the moving object, the students can unfold the kinematics, dynamics and energetics of the motion within which they were embedded. The motion incurred can be visualized on Google Earth. In this workshop, the participants will go for a run, walk or a drive to capture their motion and then analyze it. Other possibilities for student projects will be discussed as well.

Science Center 2404
PHYSICS IS FUN WITH ELECTRIC AND MAGNETIC TOYS
Dr. Ray Turner, Clemson University, Dept. of Physics, Clemson, SC 29634-0978
Phone: 864/654-5709 Email: traymon@clemson.edu

Teachers know that physics is fun. But perhaps we can also convince our students of this through the use of ordinary children's toys as physics demonstration devices. There are a variety of electric and magnetic toys available that can be used to demonstrate the simplest electric and magnetic forces as well as more sophisticated applications of Maxwell's Equations. Participants will have the opportunity to see and try both some old toys and some new ones. These will include a Static Stick, an Electro Flyer, an Energy Ball, several electric toys, a Giant Horseshoe Magnet, a Magna-Trix floating magnet, a Rainbow Spinning Wheel, Robby the Circus Seal, a Snake and Top, a Revolution, a Magna Swing, several Kinetic Toys, and a Flicker Light. Physics can be fun with toys.

Science Center 2402
What the *(^*&^(is Centrifugal Force?
Bill Baird, Armstrong Atlantic State University

A workshop exploring centrifugal force, centripetal force, the Coriolis force, and a little bit about gravity. We'll see which (if any) of these forces are real, what "real" means, where we can find examples around us, and how we can explain these ideas to students in a consistent way.