2008 Region 10 NACADA Conference

Advising best practices focus of regional education conference

The May 2008 Region 10 Conference of the National Academic Advising Association (NACADA) opened with a keynote address from Dr. Adam Johnston, Associate Professor of Physics at Weber State University and a leader in the area of science education reform. Weber’s speech focused on inspiring intellectual curiosity, improving communication, encouraging self-authorship, and understanding advising as teaching. The address was timely and moving for each of the 345 conference participants who attended the three-day conference held in Park City, Utah.

Among those participants were Karen Burrington and Sabrina Mathues from ASU Physics. Mathues serves as ASU Physics’ Undergraduate Advisor and Coordinator of Undergraduate Programs. Burrington is ASU Physics’ General Studies Coordinator to the ASU Physics’ General Studies program as well as the Master of Natural Science program. Both women deal with a large segment of the physics student population in their daily work at ASU. More and more of their success lies in a keen understanding of advising strategies Challenges to be among the most impressive conference sessions.

"It’s hard to see a student who is absolutely passionate about the material that they are studying, still run up against hurdle after hurdle—either personally or academically,” says Mathues. “This session afforded me some insights that I plan to apply in my day-to-day interactions with such students.”

On July 26, ASU Physics Academic Advisor Sabrina Mathues presented Revisiting Jaime Escalante: Motivating High-Risk Students from the Humanities to the Sciences to an audience of state NASPA members at the Prescott Resort in Prescott, AZ. NASPA is an ASU Physics staff Karen Burrington (L) and Sabrina Mathues (R) with colleagues - Doug Spencer and Bbom Anderson. As Teachers: Creating the Conditions for Learning, shared helpful techniques on how advisors and student-centered university personnel can better understand and help “at-risk” students succeed, and incorporate problem-solving strategies to help keep these students focused and on track.
When a call for travel grants went out to ASU departments seeking professional development opportunities for advisors, ASU Physics jumped at the chance.

“It really was a no-brainer,” states Peg Stuart, Department Manager of ASU Physics. “With the increase in responsibilities and workload that staff have in providing comprehensive service to all of our student populations, you have to invest in your staff. You do everything you can to equip your staff with the latest and most effective information. Because in the end, we are investing not only in student retention and success, but in the quality and effectiveness of our staff. A university cannot succeed one without the other.”

The conference theme - Making Advising Count: Turning the Ordinary into the Extraordinary – was relevant for both Burrington and Mathues’ respective areas in ASU Physics as well as their scholarly interests in education.

“During the breakout sessions we heard from speakers representing small and large universities,” commented Mathues. “It was interesting to share experiences and compare notes with advisors and advising administrators from different college environments.”

Mathues found the session When Dreams and Realities Collide: Helping Underprepared and Low-Achieving Students Face Academic

“By incorporating these simple, effective strategies to my interaction with students, I can better connect with them which results in better retention and student success,” says Burrington. “This session reminded me how important our advising role is in every student’s journey.”

The conference also addressed complicated issues in the session titled From Advocate to Enforcer: Balancing Competing Roles. In this session, advisors shared interesting opinions on how to equally balance the advisor role of advocating for the student while still adhering to university policies. Through the use of real scenarios, candid discussion, and best practices participants came away with strategies to turn an uncomfortable situation into one that is productive and manageable.

“I’m so thankful to the ASU Office of Student and Academic Programs for making this funding opportunity available to departments,” says Stuart. “The knowledge and experience they (Burrington and Mathues) have gained from this conference will have an immediate and positive impact on our students. Making that positive impact in the lives of students is why we do what we do every day.”

For more information on NACADA, click HERE.

For information on student programs through ASU Physics, click HERE.
Atypical IT

Physics team vital to departmental progress

Nano is supposed to be the next big thing. But for nano to have its predicted impact, we need to understand how to make nanostructures atom-by-atom. This is exactly what we do in the Drucker research group. We try to answer the question, "Why do the atoms go where they go when we grow a nanocrystal?" Gaining such a fundamental understanding of nanocrystal synthesis provides crucial guidance for engineering next generation technologies. Essentially, this fundamental ASU has unique capabilities that make that job much easier. We just make movies of the NWs growing in the Tecnai F20 environmental transmission electron microscope (ETEM). Fig. 3 is a frame grabbed from the end of such a movie. View the entire movie HERE. The entire movie can be viewed online at http://physics.asu.edu/jsdruck/NW.mov.
knowledge lets us know what we can get away with when designing nanocrystals for a particular application. Currently, our interests are focused on nanocrystal self-assembly. Self-assembly is exactly what it sounds like. We magically grow nanocrystals by letting Nature do all of the work for us in this "bottom up" process. This contrasts sharply with the "top-down" processes used in manufacturing microprocessors for today's computers. Rather than using lithography to pattern materials for a particular function, self-assembly exploits the thermodynamics and kinetics of the growth process to produce nanocrystals with well-defined size, shape and composition.

One of the projects that we are involved in uses a technique called vapor-liquid-solid (VLS) growth to form nanowires (NW). In VLS growth, we deposit 20-100 nanometer diameter gold (Au) 'seeds' directly onto silicon (Si) wafers. We heat the Si wafers to 400°C and some Si from the wafer dissolves into the Au seed to form a liquid metal droplet. We then introduce some disilane (Si₂H₆) vapor into the growth chamber. The disilane decomposes at the liquid/vapor interface and some additional Si dissolves causing a crystal to grow at the solid/liquid interface. This process continues with the liquid metal droplet floating at the tip of a single-crystal Si NW. The diameter of the NW is controlled by the size of the Au seed and the length is controlled by the growth time. Aspect ratios of greater than 1000:1 can be readily achieved. This is the basic idea behind VLS as initially discovered in the 1960s, but the physics of the process is not well understood.

As an example, we would always like to grow NWs that look like those in fig. 1, but slightly different growth conditions lead to NWs that look like those in fig. 2. The small dimensions of the NWs pose real challenges for investigating their growth. Fortunately, ASU has unique capabilities that make that job much easier. We just make movies of the NWs growing in the Tecnai F20 environmental transmission electron microscope (ETEM). Fig. 3 is a frame grabbed from the end of such a movie. The entire movie can be viewed online at http://physics.asu.edu/jsdruck/NW.mov.

This NW changes its growth morphology when we change the temperature by a small amount.
380°C look 'wormy'. At this lowest growth temperature, the NW randomly changes growth direction. We're still thinking about the detailed mechanism for these drastic changes in growth morphology induced by relatively small growth temperature excursions.

The final model will likely encompass details of how the individual Si atoms incorporate into the growing NW at the planar growth front. To do so, they must locate single-atom-high steps at the liquid-solid interface after diffusing along the planar growth front. Understanding the details this process will be a challenge, but that's why we're in this business. As an example, we would always like to grow NWs that look like those in fig. 1, but slightly different growth conditions lead to NWs that look like those in fig. 2. The small dimensions of the NWs pose real challenges for investigating their growth. Fortunately,

Segments grown at 425°C are straight single crystals. Those grown at 400°C grow straight between localized kink sites and those grown at 380°C look 'wormy'. At this lowest growth temperature, the NW randomly changes growth direction. We're still thinking about the detailed mechanism for these drastic changes in growth morphology induced by relatively small growth temperature excursions.

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From the Chair...

Welcome back to ASU Physics

It is a pleasure to extend the warmest welcome to all of our new and continuing students. In the first days of the semester the campus has been alive with excitement as students search for their classes, assemble their course materials and renew old friendships and make many new acquaintances. Just a few of my first impressions – there are more skateboards than last year, there are more bicycles than last year, there are more scooters than last year, and our students seem healthy and excited to be here. (Walking is, however, more complex.

The enrollments in all of our programs continue has over 180 registered students. It is rapidly becoming one of the largest in the country. I note this as background to an important initiative of the American Physical Society where the Executive Board has recently released a statement that notes: “We advocate doubling the number of bachelor degrees in physics to address critical national needs, including K-12 education, economic competitiveness, energy, security and an informed electorate…” (learn more at their HERE). Our majors are able to broadly apply the principles of physics to society’s most critical problems, and as noted by the APS this will be a critical need as our society is facing numerous challenges.

Our acclaimed graduate program welcomes a group of highly skilled students from over the US and around the world. These students will help guide our undergraduates in lectures and laboratories, and they will be the heart of our research program that pushes the frontiers of knowledge.

Welcome (back) to everyone! Good luck with
to grow. With about 4,000 registered students in our courses, this is again a record for ASU Physics. We have also seen significant growth in the new physics courses offered on the Polytechnic Campus as three new assistant professors have joined the Faculty of Physics in the College of Applied Sciences.

Our majors program on the Tempe campus has shown tremendous growth in the last few years and now

solving your challenging homework problems and in your search for new knowledge.

Sincerely,

Robert J. Nemanich