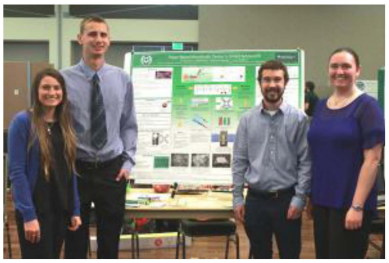
2017 BME E-Days Awards

On April 14, 2017, members of the SBME Advisory Board—Dennis Bruner, Julie Dunn, Jeff Samson, Ray Goodrich, Gary Johnson, Steve Simske, Dennis Schlaht, and Jay Srinivasan—served as judges and provided four biomedical engineering teams with cash awards at E-Days, a longstanding annual showcase of capstone senior design projects.

This year, four industry members also served as BME judges—Alan Dean of Beckman Coulter, Khoa Vu and Briden Stanton of Terumo BCT, and Reginald Stilwell of AlloSource—critically evaluating student projects on technical content, presentation, creativity, and overall impression. The following BME student senior design projects were awarded:

First Place: Paper-Based Microfluidic Device for Salmonella Detection (faculty advisor: Chuck Henry)
Team: Maya Kayyali, Sean Visocky, Joe Johnson, and Micki Repasky



The overall goal of this project was to use paper-based microfluidic devices to develop low-cost diagnostic assays to detect Salmonella bacteria and be deployed in developing countries to improve global healthcare. Paper-based microfluidic devices are made from ordinary filter paper that has been patterned to create fluidic circuits. The team redesigned the assay to simplify operation to enable an untrained user to operate the system in the field.

Second Place (tie): Bone Matrix Airbrushing (faculty advisors: Ketul Popat and Matt Kipper)
Team: Mollie Phillips, Michelle Ablutz, Will Raymond, Michael May, and Josh Hayes

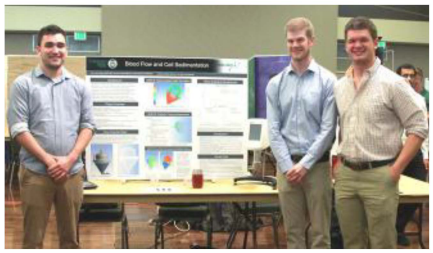
In the design of scaffolds for tissue engineering features at the nanoscale are of particular interest. Natural polymers do not have the processability of synthetic polymers, limiting their ability to mimic the hierarchy of structures in the natural extracellular matrix. Thus, they are often combined with carrier polymers. Demineralized bone matrix (DBM), a natural polymer, is allograft bone with inorganic material removed. DBM contains the protein components of bone, which includes adhesion ligands and osteoinductive signals. In this project, the team developed a novel method for tuning the nanostructure of DBM through electrospinning and airbrushing. Different blends of solvents were explored and viscosity measurements were also made since this is important for electrospinning. Finally, scaffolds were fabricated using optimized electrospinning and airbrushing conditions, and adipose-derived stem cell functionality was evaluated.

Second Place (tie): Fourier Ptychographic Imaging (faculty advisors: Randy Bartels and Ali Pezeshki)
Team: Brandon Kreutz, Nicholas Brown, and Robby Stokoe

The team built a new type of microscope that is capable of high-resolution imaging over a very large field of view. The images were reconstructed using a Fourier Ptychography algorithm based on numerical phase retrieval image reconstruction.

Third Place: Blood Flow and Cell Sedimentation Simulations (sponsor: Terumo BCT)
Team: Jesse Masterson, Ben Bagby, and Mike Hattel

Terumo BCT is interested in improving their simulation abilities related to fluid flow and sedimentation of cells in a high gravity-field, for both anticoagulated whole blood and low concentrations of specific blood cell types. The team worked on scoping what software and computer simulations are used in practice today in both academia and in industry. In parallel, the team attempted to develop a non-hazardous fluid with particles that can simulate blood flow and sedimentation. The team then began using the selected software packages and testing was done comparing the computer simulations as well as the artificial fluid against real blood.



E-Days provides undergraduate engineering students an opportunity to showcase their completed senior design projects to faculty, family, industry representatives, and peers. The capstone senior design project teaches students how to succeed in a well-integrated, interdisciplinary engineering design environment and allows students to develop practical, hands-on skills.

If you are interested in viewing biomedical engineering senior design projects and interacting with our students, please join us for next year's E-Days event on Thursday, April 12, 2018 in the CSU Lory Student Center Ballrooms.