

Mastering scientific survival skills

By Carrie Koplinka-Loehr



"Our duty is to get people to look out of their silos. New endeavors *have* to be collaborative. This is what's happening with these students, and it's enlightening to see them work together."

—James Casey, PhD



BIOAP6100 students participate in team-building exercises during orientation.

About a dozen students entering the Biological and Biomedical Sciences (BBS) program each fall have a rare opportunity: to submit a research proposal to a review panel, then listen (and jot notes furiously) as the panel critiques it. What panel members would encourage this? Their classmates, in an exercise modeled after the National Science Foundation (NSF) grant review process. It's a core activity in a course that develops leadership called BIOAP6100—By Scientific Design: Skill Building for a Career in the Life Sciences.

BIOAP6100 is taught by a trio of faculty: David Lin, PhD, associate professor of neurobiology, Holger Sondermann, PhD, associate professor of molecular medicine, and James Casey, PhD, associate professor of virology. "The goal is survival skills for graduate students," said Lin. "The class promotes leaders in that we want students to speak up, take control of their learning, and be active members of the scientific community." Students learn how to give a presentation, state a hypothesis, design an experiment, interpret data, and analyze literature. "They have to write grants, and if they're eligible to submit, they do it," said Lin. "That provides real world context and urgency."

In four years of offering BIOAP6100 in its current format, 27 students affiliated with the course have applied to the NSF Graduate Research Fellowship Program. Seven received the prestigious three-year award and eight received honorable mentions. In 2014 alone, nine applied, one received an award, and four received honorable mentions.

BIOAP6100 mirrors the hands-on, interdisciplinary nature of BBS, an umbrella program for 85 doctoral students. It embraces five related fields aimed at improving human and animal health. "We allow students to pick faculty mentors from across Cornell according to their interests," said Lin, "and most other programs here don't do that. They can meld nutrition and microbiology; they can build their own program."

All of the BBS students are in the Cornell College of Veterinary Medicine. Each student is mentored by an older student; they form a cohort and learn to collaborate—a critical step for their careers, given that the focus of BBS is to prepare students for research in academia, government, or industry. "Our duty is to get people to look out of their silos," said Casey. "New



endeavors *have* to be collaborative. This is what's happening with these students, and it's enlightening to see them work together."

Last fall, second-year BBS student Melissa McDowell wrote an NSF proposal and asked a team of her former BIOAP6100 classmates to review it before submission. On April 1st,

NSF announced that McDowell would receive a graduate research fellowship for "Characterization and Engineering of Therapeutic Delivery Methods For The Human Peripheral Blood Derived Mesenchymal Stem Cell Secretome," placing her among 2,000 awardees from a field of 16,500 applicants.

Through her two-part project, McDowell will identify and characterize the factors in secretions of equine mesenchymal stem cells in the hopes of understanding the role they play in healing wounds. She will also determine how porous capsules containing the stem cells could deliver their cell-signaling factors.

Potential applications of this technology range from delivering insulin as a diabetes treatment to certain cancer therapies. "There are so many ways we can benefit health once we know what the cells are secreting," explained McDowell. "Utilizing that and safely delivering it could really make a difference in humans and animals."

McDowell said that BIOAP6100 fostered teamwork and gave her the foundation needed for writing proposals. In addition, she believes the professors, who themselves were writing grants, modeled openness and honesty. Said McDowell, "we learned to be able to say why our grant is important and what it could do for society."

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Students in Biological and Biomedical Sciences take part in leadership course BIOAP6100—By Scientific Design: Skill Building for a Career in the Life Sciences.