Learning Goals and Preparation for the Senior Thesis in Biology

The senior thesis, a year-long research project that includes both written and oral presentations of independent scholarly work, is the capstone of the Biology major at Haverford. Preparation for thesis research begins with the first course for Biology majors, Bio200, and continues for each course thereafter, so that all of the learning goals are consistently re-enforced. For example, all students in laboratory courses (such as Bio200 and Bio300) work with a lab partner or in small groups so that they learn to work collaboratively; on other hand, students are also called upon to present their work individually and to maintain their own research lab notebooks, so that they learn to work independently and share responsibility for all parts of the project. The students are given directed journal clubs in Bio200 and in more advanced courses, that require them to read and critique a research paper from the original scientific literature, with an accompanying oral presentation. The Bio30x courses (301, 302, 303, etc), typically taken during the junior year, are based on current research in biology, with an emphasis on integrating this new information into a broader understanding of biological topics. The primary focus in these courses is not simply on the current information itself but rather on how this was determined experimentally. This emphasis on how biology is studied provides the students with the skills needed to understand how modern research is done.

Bio300, the junior-level laboratory course, is intentionally modeled on the work that students are expected to conduct for their senior research thesis. The emphasis in this year-long course, which is required for all Biology majors, is not principally on the acquisition of new research techniques but rather on hypothesis-testing, data analysis, experimental trouble-shooting, record keeping, and oral and written presentations. The projects in Bio300 are designed to be intellectually open-ended; students share results and insights, and work to understand the current literature and to connect their findings to what is already known.

The learning goals for the senior thesis include: increasing intellectual independence and initiative; creativity and rigor in experimental design, execution, and interpretation; reproducibility, accurate record keeping, and productivity. These are criteria by which we can assess the students’ maturation as scholars and how well the learning goals have been achieved.