

QB 826, Introduction to Quantitative Biology Techniques

QB 826, *Introduction to Quantitative Biology Techniques*, is an intensive one-week workshop (1-credit) conducted before the start of fall semester.

The goal of this workshop is to combine professional development with various dimensions of interdisciplinary research, such as teamwork, cultural and vocabulary differences, as well as diversity in the learning and thinking process. Students from biological and chemical/physical and mathematical/computational fields will work in different interdisciplinary teams everyday.

Days will be divided in morning sessions, usually spent in the biology lab; afternoon sessions, spent in the computer lab; and two evening sessions, dedicated to discussions and presentations. Students will work in pairs that will change every day, to maximize the exposure of every student to students trained in other disciplines.

The biology lab section is designed for bio-trained students to train non-bio students to do simple tasks around the lab: preparing buffers and media (1 day), bacterial growth curve (1 day), enzyme assays (1 day), genomic DNA miniprep, PCR, and agarose gel (1 day), and protein unfolding (1 day). In these sessions, non-bio students will learn some biology vocabulary and basic wet lab techniques. They will acquire a sense of what it takes to accumulate experimental data, and the sizes of errors associated with typical biological data.

In the computer lab section, students will learn basic commands in UNIX, analyze their enzyme assay data from the bio lab section and do curve fitting, calculate inhibitor constants, model a protein 3D structure, bind a ligand in a catalytic site, and practice with bioinformatics, and microarray analysis tools.

Evening discussions and presentations will integrate aspects of interdisciplinary research. In student presentations, pairs of interdisciplinary students will be asked to introduce a concept, or a technique, and present an application in biology.

The main focus of this course is not so much to learn many techniques, but for students coming from different backgrounds (math, physics, bio, computer sci, statistics, chemistry, etc) to learn to work together, learn how people with different educational backgrounds think, to prepare students to work in interdisciplinary environments.

Syllabus of the QB 826 course taught August 17-21, 2009, from 9:00 AM to 6:00 PM.

Monday	Morning	<i>Bio lab:</i> Buffers, media preparation, pipetting, sterilization
	Afternoon	<i>Computer lab:</i> Unix basics, PyMol molecular visualization tool
	Evening	<i>Selecting final projects/assignments</i>
Tuesday	Morning	<i>Bio lab:</i> growth curve, standard curve, spectrophotometer linearity
	Afternoon	<i>Computer lab:</i> Microarray data analysis
Wednesday	Morning	<i>Bior lab:</i> Genomic DNA purification, PCR, agarose gel electrophoresis
	Afternoon	<i>Computer lab:</i> Bioinformatics, genome annotation (same genome as in the morning)
	Evening	<i>Discussion</i> with interdisciplinary students and a professional
Thursday	Morning	<i>Computer lab:</i> Homology modeling of protein structures
	Afternoon	<i>Computer lab:</i> Protein-ligand docking and scoring
Friday	Morning	<i>Bio lab:</i> Enzyme (thrombin)/inhibitor assays
	Afternoon	<i>Computer lab:</i> Curve fitting, calculating K_m for substrate and K_i for inhibitor.
	Evening	<i>Student presentations</i>