QB 826, Introduction to Quantitative Biology Techniques

A 1-credit, intensive lab workshop before the start of fall 2012
Monday to Friday, August 13–17, 9:00 AM to 5:00 PM

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.

Instructors: Claire Vieille   6172 BPS   884-5392   vieille@msu.edu
                  Guest instructors

Grading: Pass/Fail course

Enrollment: 12 maximum.

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.

Schedule QB 826 August 13 – 17, 2012

Mo, Tu, Th, and Fr: 9:00–12:00 and 2:00–5:00
We: 9:00–12:00, 2:00–5:00, and 6:00–8:00

Biology lab sessions:	Biochemistry room 113
Computer lab sessions:	Th, Fr: BPS room 2245
	Mo, Tu, We: Biochemistry room 202
Evening discussion:	We: Biochemistry 208

Monday Intro to the course at 9:00 AM in Biochemistry room 208

<u>AM</u>: *Bio lab*: Buffers, media preparation, pipetting, sterilization (Vieille)

<u>PM</u>: *Computer lab*: Unix basics, PyMol molecular visualization tool (Pappan)

Tuesday <u>AM</u>: *Bio lab*: growth curve, standard curve, spectrophotometer linearity (Vieille)

<u>PM</u>: *Computer lab*: Homology modeling of protein structure (Pappan)

Wednesday <u>AM</u>: *Bio lab*: Genomic DNA purification, PCR, agarose gel electrophoresis (Vieille)

<u>PM</u>: *Computer lab*: Protein ligand docking (Kuhn)

<u>Evening</u>: *Discussion*: benefits and difficulties associated with doing interdisciplinary research (Vieille)

Thursday <u>AM</u>: *Bio lab:* Protein purification (Vieille)

<u>PM</u>: *Computer lab*: To be announced

Friday <u>AM</u>: *Bio lab*: Enzyme kinetic assays (Vieille)

<u>PM</u>: *Computer lab*: Curve fitting, calculating K_m for substrate and K_i for inhibitor. (Using results from morning experiments) (Vieille)