

Genetics 875 Special Topics in Genomic and Proteomic Analysis Fall 2006

Class Meets: Tuesday and Thursday, Room: **1408 Biotech Center**, Time: 9:55-10:45am

LAB Meets: Thursday, **1240 Biotech Center/BNMC classroom**, Time: 11:00am-1:00pm

Office Hours: by appointment

Office: Nicole 4434 Genetics/Biotech, Audrey 3426 Genetics/Biotech, Ahna 2426 Genetics/Biotech

Course website: <http://skop.genetics.wisc.edu/Genetics875.html>

Instructors: Nicole Perna: nicole@genome.wisc.edu

Phone: 890-0171

Audrey Gasch: agasch@wisc.edu

Phone: 265-0859

Ahna Skop: skop@wisc.edu

Phone: 262-1593

Biology is being transformed by rapidly developing genomic and proteomic technologies that produce massive amounts of biological data. Central to this transformation is the analysis of that data to extract meaning and provide insights into biology. This course will survey genomic and proteomic approaches and methods of data analysis. We will cover conceptual aspects as well as methodology and technical advances that are central to obtaining and exploring genomic and proteomic data.

Organization: The course consists of a lecture/discussion portion and a hands-on computer lab portion. Lectures will be complemented by readings from primary literature. Access to a computer outside of class will be essential. If you do not have access to a computer, please see one of us and we will arrange something for you. Discussion formats will vary with instructor. Be sure to read each unit syllabi carefully. Discussion classes (where indicated*) will be conducted as a "journal club".

Grades:

Students will receive a grade for each unit (based on homework assignments and class participation), which will be averaged to account for 40% of the grade for the overall course. Information on how each unit will be graded is provided in the detailed Unit syllabi. The independent semester-long project will count for the remaining 60% of the grade.

Project: A semester-long project will be conducted by each student. The goal is for students to get hands-on experience in genomic and proteomic data analysis by utilizing as many of the covered tools and approaches as are reasonable for the project objectives. Each student will choose a faculty member to work closely with on his or her project. The project should be designed by the student in consultation with the instructor, keeping in mind the goal of using multiple techniques covered in class. Students are encouraged to design a project that is related to their own research objectives. Alternately, the instructors will provide project topics related to their own research interests.

The project and grading will be broken down into three portions:

By Sept. 21st: Students should meet with their chosen advisor to discuss their class project.

Due Oct. 5th: Objectives/Project proposal outline (20% of Project grade, 1 page)

Due Nov. 7th: Detailed plan of analyses (including datasets, programs, methods to be used) & preliminary results (20% of Project grade, 2 pages)

Due Dec. 7th: Final Paper, 8-10 pages (including figures + extra pages for refs. (along with presentation worth 60% of Project grade).

Dec 12th & Dec 14th: Each student will give a 10 minute presentation on project

Homework and Web Assignments:

Each instructor will provide homework and accompanying websites. Due dates will be determined by the instructor.

Attendance policy:

Attendance is expected, unless prior notification is given, and will be factored into the final grade.

Reading Schedule:

Readings will be announced by instructor of that section and can be found on the website.

Required Activities:

Students are expected to-

- Complete the required reading before the associated class section.

- Participate in class discussions on the readings

- Complete the homework and project on time (see guidelines).

Encouraged Activities: The following will help you learn more-

- Think and ask questions during lectures. Ask questions outside of lectures.

- Read beyond the assigned readings. Spend time exploring on-line resources related to genomics and proteomics,

- Form discussion or help groups to go over readings, lecture material, or computer exercises. Attend seminars on campus in the area of genomic and proteomics. We will announce some in class.

- If all else fails, GOOGLE it!

Teaching Schedule: (subject to change)

Date	Instructor	Notes	Topics Covered
Tuesday 9/5/2006	Nicole		Genome Sequencing and Assembly
Thursday 9/7/2006	Nicole		LAB: Genome Assembly and Gap Closure
Tuesday 9/12/2006	Nicole		Gene Prediction & Sequence Similarity Searches
Thursday 9/14/2006	Nicole		LAB: Gene Prediction and BLAST at NCBI
Tuesday 9/19/2006	Nicole		Comparative Genomics – Orthology, Paralogy, Xenology
Thursday 9/21/2006	Nicole		LAB: Comparative Genomics
Tuesday 9/26/2006	Audrey		Protein alignment & tree building methods
Thursday 9/28/2006	Audrey	Nicole's Section Project Due	LAB: tree building using ortholog sequences
Tuesday 10/3/2006	Audrey		Microarray analysis, Part I
Thursday 10/5/2006	Audrey	Project Proposal Outline Due	LAB: clustering and distance metrics
Tuesday 10/10/2006	Audrey		Microarray analysis & Gene Ontology, Part II
Thursday 10/12/2006	Audrey		LAB:extracting biology from microarray data
Tuesday 10/17/2006	Audrey		Regulatory motif prediction
Thursday 10/19/2006	Audrey		LAB: Motif identification and analysis
Tuesday 10/24/2006	Audrey		Integrative data analysis for genomic analysis
Thursday 10/26/2006	Audrey		LAB: Shortcourse on PERL programming
Tuesday 10/31/2006	Audrey		Phylogenetic footprinting, SNP & QTL mapping
Thursday 11/2/2006	Audrey		LAB: Work on individual projects
Tuesday 11/7/2006	Ahna	Detailed Plan & Preliminary Results Due	Intro to Proteomics & Section Overview
Thursday 11/9/2006	Ahna		Functional Genomics I & Chemical Genetics* LAB: RNAi databases, PFAM & SMART
Tuesday 11/14/2006	Ahna		Functional Genomics II: Global Analysis of Protein Localization*
Thursday 11/16/2006	Ahna		2D gel analysis & MuDPIT* LAB Tour: Proteomics Facility
Tuesday 11/21/2006	Ahna		Quantitative Proteomics-ICAT & SILAC*
Thursday 11/23/2006	Ahna	Thanksgiving NO CLASS	NO Class
Tuesday 11/28/2006	Ahna		Organelle Proteomics *
Thursday 11/30/2006	Ahna		Protein Complex Identification--Y2H & TAP Tags* LAB: Help with final projects
Tuesday 12/5/2006	Ahna		Protein Chips & Microarrays--SELDI-TOF *
Thursday 12/7/2006	Ahna	Final Paper Due	Biological Networks * LAB: Cytoscape & Creating Interaction Networks
Tuesday 12/12/2006	Ahna	Final Presentations	Final Presentations
Thursday 12/14/2006	Ahna	Final Presentations	Final Presentations

