

Genetic Biotechnology - Biology 4840 - Spring 2011

BIOL 4840 provides CSU Stanislaus undergraduates the opportunity to contribute to original research involving a large-scale DNA sequencing projects from Washington University St. Louis Genome Sequencing Center. Students will analyze portions of chromosome 3 of *Drosophila erecta* and compare the data with to chromosomes of *D. melanogaster* to determine genome organization.

Instructor- Dr. James J. Youngblom

Email- jyoungblom@csustan.edu

Office- N264 (667-3950)

Office hours- Mon. & Wed. 2:00-3:30, or by appt.

Required Materials- “Gene Cloning- Principles and Applications” by Lodge, Lund, and Minchin, Taylor and Francis Group, 2007
“The Genome War” by James Shreeve- Ballantine Books, 2005

Important Dates-

Wed. Feb. 23- Last day to drop a course

Spring Break- No classes, Mar. 21 - 25

Thur. Mar. 31, - No classes, Cesar Chavez Day

Fri. May 13, No afternoon classes, Warrior Day

Wed. May 18- last day of classes

Exams/Quizzes/Reports-

First 4 weeks- Lab Reports- 40 pts. possible

EXAM 1-Wednesday- Mar. 2- 50 pts.

Quiz #1- Friday, Mar. 11, 10 pts (The Genome War: Chapters 1→ 8)

Quiz #2- Friday, Mar. 18, 10 pts (The Genome War: Chapters 9→19)

Quiz #3- Friday, Apr. 1, 10 pts (The Genome War: Chapters 20→ end)

Lab Progress reports due- Fri. Mar. 18, 10 pts.

Journal Article Quiz- Friday Apr. 8, 30 pts.

EXAM 2- Monday – Apr. 18- 50 pts.

Oral Presentation, Friday May 6 or 13, 50 points

Final Lab report, Friday, Apr. 29, 60 points

FINAL EXAM- Friday May 20 at 11:15- 90 pts.

The lectures:

The lectures in this course analyze molecular biotechnology. All course materials relate to the recombinant DNA revolution of the past 35 years. We will discuss the tools and materials necessary for gene cloning and analysis. In this course I will attempt to introduce you to thinking on a genomic scale. In particular we will discuss how our ability to sequence genomes gave rise to genomics, proteomics, transcriptomics, etc.

Lecture topics (subject to minor modification):

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| 1. | Review Molecular Genetics | 13. | Creation of Genetic Maps |
| 2. | Restriction Enzymes | 14. | SNPs vs. STRs |
| 3. | Cloning Vectors | 15. | ESTs, RNAi |
| 4. | Gel Electrophoresis, PCR | 16. | Mass Protein Production |
| 5. | Genetic Libraries | 17. | Biotech Industry, Drug approval |
| 6. | Advanced Cloning Vectors | 18. | Gene Therapy |
| 7. | Screening a Genetic Library | 19. | Transgenics, Biotech crops |
| 8. | Chemical Synthesis of DNA | 20. | Transcriptomics |
| 9. | DNA sequencing Methods | 21. | DNA Microarrays |
| 10. | DNA sequencing Methods II | 22. | Proteomics |
| 11. | DNA sequencing Strategies | 23. | Protein structure Determination |
| 12. | High-throughput Sequencing | | |

The labs:

In the lab periods you will have an opportunity to conduct original research in genomics. The lab tools will be various examples of DNA sequence analysis software. Each pair of students will be assigned a 40 - 59 kb file of unanalyzed *Drosophila* DNA. Students will annotate or genetically analyze this large piece of DNA.

- During the first four Fridays of the semester, the class will work together to explore several DNA analysis software tools. During this time, students will learn how to analyze genomic data.
- At the fourth lab meeting of the semester, each pair of students will be assigned a file of DNA from *Drosophila erecta* (40-59 kb).
- Independent project work will happen in class and outside of class, with progress reports due on **Mar. 18**.
- On **May 6 or 13** each pair of students will give 10-15 minute PowerPoint presentation, summarizing their gene annotation projects.

Class information:

The website <http://blackboard.csustan.edu> will have a link for this class. On Blackboard, I will post journal articles pertaining to this class. The lectures for this class will be presented in PowerPoint. The PowerPoint lectures will also be available on-line at <http://blackboard.csustan.edu>.

The exam questions are taken from the lectures, handouts, assigned readings, & assigned chapters in Gene Cloning. The exams are a combination of matching, true or false, multiple choice, short essay, and problem solving. The first 2 exams are not comprehensive. Most of the final exam is also noncomprehensive. However, I reserve the option of incorporating some important topics from the early part of the semester into final exam. No leaving the classroom during exams.

Cheating- Students caught cheating are automatically awarded an F. They are no longer allowed in class and a report is filed with the Dean of Student Affairs. All electronic devices (including phones) & headphones must be kept in purses or backpacks during the exams and quizzes. No exceptions. You can use a real calculator and not the calculator function on a cell phone or PDA.

Taping Policy- Audiotaping of classes is permitted only with prior permission of the instructor; videotaping is not permitted under any circumstances. Authorized tapes are for the personal use of the student, and may not be distributed to others without the permission of the instructor.

Guest Policy- Guests are permitted in class but only with prior permission of the instructor.

Make-up- If you know you can not be in class on the day of an exam, please see me beforehand so we can discuss your situation. In some circumstances, I will allow a make-up exam. If something comes up unexpectedly on the day of an exam, please call me. If you leave a message, leave a phone number and I will contact you to discuss your situation. Don't 'let it ride' and plan on discussing it with me later. If your situation warrants a make-up exam, then schedule your make-up exam ASAP. If I haven't heard from you by the time I am ready to hand back the exams, you get a 0.

Grading: I will grade on a curve using the +/- grading system. Students at or above 90% will be guaranteed an A- or higher, students at or above 80% will be guaranteed a B- or higher, students at or above 70% will be guaranteed a C- or higher, students at or above 60% will be guaranteed a D- or higher.

How to do well in this class-

1. **COME TO CLASS-** take good notes, ask questions
2. Read the chapters accompanying each lecture
3. Reread the chapters if necessary
4. Study the new terms- use the internet for extra help (there is unlimited amounts of information related to course topics online)
5. If material is unclear, see me during my office hours
6. Start early and work diligently on your lab projects. Keep good lab notes.