

# BIOL 4850- DNA Technology in Forensic Science

Spring 2012

Dr. James Youngblom

**Meeting Time-** Thursday 1:00-4:50, Naraghi Hall 334

**Prerequisites-** passing grade in BIOL 3350 or BIOL 2310

**Best way to contact me: Email-** [jyoungblom@csustan.edu](mailto:jyoungblom@csustan.edu) **Office phone-** 667-3950

**Office-** Naraghi Hall 264 (I also spend considerable time in N124, N161, N332, & N334)

**Office Hours-** Mon.12:00-2:00, Wed. 12:00-1:00 or by appt.

**Required Texts-** “Fundamentals of Forensic DNA Typing” by John Butler (Acad. Press, 2009)  
“The Bleeding” by Joseph Wambaugh

**Equipment needed-** Simple 3 ring binder to organize weekly handouts.

## Dates to Remember-

Thursday Feb. 2- Last day to add a course

Wed. Feb. 22- Last day to drop a course

Fri. Mar. 30 - No classes, Cesar Chavez Day

Spring Break- No classes, Apr. 9-13

Fri. May 11, No afternoon classes, Warrior Day

Tues. May 15- last day of classes

## Exams:

Mar. 1- **Exam #1 (60 pts)**

April 19- **Exam #2 (60 pts)**

April 26- **Quiz #1 (30 pts)**

**Thursday May 17, 2:00 p.m. - Final Exam (120 pts)**

Each exam will be a mixture of different types of questions (such as true/false, multiple choice, problems, short answer, and short essay). The exams will be based on lecture material, reading in the text, and the laboratory exercises. The first two exams are not comprehensive. The final exam is comprehensive. **No leaving** the classroom during exams. The quiz on April 26<sup>st</sup> will be taken entirely from the book “The Bleeding” by Joseph Wambaugh. This book is available in paperback (< \$10) and is found in many libraries. Read it in its entirety and you will do well on this quiz.

### **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 the situation. I may allow you to take the exam at a later date. If something comes up unexpectedly on the day of an exam, please contact me. If you have a leave a message, leave a phone number and so we can be in touch. Don't 'let it ride' and plan on discussing it with me later. If I don't hear from you promptly, you get a 0.

### **Lab Reports/Write-ups:**

Lab Reports- 15 pts. each = 30 pts.

Lab Write up #1= 10 pts.

Lab Write up #2= 30 pts.

Lab Reports and Write-ups are due at the beginning of the lab. See the lab schedule for the due dates. Late reports are penalized 5 pts. per day. Lab reports are not group activities. Do your own work and don't copy the answers from someone else's report. The lab reports are designed as a checkpoint- a chance for you to see if you are learning the right things. If you are unable to complete the lab report, you need to see your instructor for extra help. Save your lab reports. They are valuable study guides.

The lab writes are an exercise in taking good lab notes. The first one is designed to give you feedback for the second lab write up. We will discuss good note taking in class.

### **Grading:**

I will utilize the +/- grading system; at the end of the term I will assign each student one of these grades- A, A-, B+, B, B-, C+, C, C-, D+, D, D-, or F. 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.

### **Notes:**

Each Thursday you will complete a laboratory exercise. A PowerPoint lecture of 30-60' will be presented some time on Thursday afternoon. The lecture will not be given at 1:00 but will be presented when there is an appropriate window of time in the lab protocol. At some time during the afternoon, there will be a formal break (~10') where everyone should step out of the lab.

All work will be done in pairs. There are 12 sets of equipment and will be 24 students in this class. The lab exercises will be described in lab handouts. Both the lab exercises and the PowerPoint lectures will be available electronically on the class Blackboard site.

The lectures will relate to the use of DNA in U.S. courtrooms. I will describe how DNA evidence was introduced in the late 1980s, modified in the mid 1990s and how it is used today. I have a

number of thought provoking films we will watch. Some of these films document important criminal cases that hinged on DNA evidence. Some analyze the U.S. criminal justice system.

It is expected that each student in this class will be willing to donate tissue for purposes of isolating and analyzing your own DNA. The tissue requirements are minimal- cheek cells removed with a mouthwash. It is unlikely but possible that we could discover an abnormality in your DNA should such an abnormality exist. However it is not possible that we could uncover an informative abnormality as all of the DNA sites examined are specifically selected as nonphenotypic loci. The only exception would be in the multiplex PCR analysis where one of the sites analyzed will reveal the sex chromosome constitution of the donor. Should someone possess something outside the norm (XX in females, XY in males) it could be revealed in this exercise. Students have the option of declining to use their DNA in this exercise.

**Student Conduct-** Most labs will run the full four hours. Attendance is required. Do not enroll in this class if you have conflicts or other commitments on Thursday afternoons. If you fail to attend you are guilty of dumping extra work on your partner. Be on time for class. During the first few minutes of each class period we will discuss the day's activities. Students are awarded **0.5 bonus point for each lab where they are at their bench at 1:00 and stay until class is dismissed!** Do not leave the classroom in the middle of a lecture. Do not use cell phones, ipods, or other electronic devices during class. Computers are only allowed in class as a tool for note taking or class exercises.

**Cheating-** Students caught cheating are prosecuted as described in the university catalog. 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 generally not permitted in this class. For an exception to this policy you must request prior permission.

### **Student Presentations-**

Each student must find a partner and together select one article from the Journal of Forensic Science (full text of this journal is available from Electronic Journal Collection of the CSUS library at <http://library.csustan.edu/serialsolutions/onlineJournals/jnlsIndex.html>). The article must pertain to Forensic DNA and have been published in 2010, 2011 or 2012. You and your partner must work together to assemble a PowerPoint presentation. This presentation must explain the article. You do not need to explain basic genetic terms that have already been explained in class. Rehearse your PowerPoint presentation. Each person must present half of your slides. The presentation should be 9-12 minutes in length. **Your score will be deducted if your presentation is too long or too short.** You are not allowed to read anything during your presentation. No reading of notes, and no reading of your PowerPoint slides. Use your

PowerPoint slides as a rough outline for you to follow and then know the material well enough to explain each slide without reading it or using notes. Show important diagrams from the paper and explain them to the class.

Your classmates will help in grading your presentation- 1/2 of your class presentation score is determined by your classmates. All students in attendance will rate your presentation but the top ¼ and bottom ¼ of student scores are ignored. Students that give all presenters high scores (B+, A-, or A) are not utilized in giving out grades.

## Laboratory Schedule; Lecture Schedule- in bold

Jan. 26 (1) Lab Safety, Metric System, Use of Pipettors, Restriction Enzyme Digest  
**(Forensic DNA Overview)**

Feb. 2 (2) Run/Stain/Analyze Agarose Gels  
**(Sex, Lies, and DNA)**

Feb. 9 (3) DNA isolation (human cheek cells), Set up PCR (*Actinin-3*); **Lab Write up due**  
**(Basics of PCR)**

**Feb. 16 (4) Run/Stain/Analyze Gel of PCR product- Lab Reports due**  
**(RFLP, early Forensic DNA Tests)**

Feb. 23 (5) Quantify cheek cell DNA Recovery- Slot Blot  
**(DNA Quantification)**

Mar. 1 (6) **Exam #1**, DNA isolation (DNA from human blood)  
**(Crime Scene Analysis- guest speaker)**

Mar. 8 (7) Analyze DNA Typing Sticks, Set up Profiler/Cofiler Reactions  
**(PCR2, controls, precautions)**

Mar. 15 (8) Set up PCR reactions (mtDNA), Run short agarose gel  
**(STRs)**

**Mar. 22 (9) Analyze Profiler/Cofiler Results, Clean up mtDNA; Lab Write up due**  
**(Allelic Frequencies)**

**Mar. 29 (10) Analyze Y Chromosome STRs- Lab Reports due**  
**(Forensic Analysis of mtDNA, Y chromosome DNA)**

Apr. 5 (11) Analyze mtDNA sequences (**CODIS**)

Apr. 12 No Class, Spring Break

Apr. 19 (12) **Exam #2**, Forensic analysis of DNA using the Cyberatory Virtual Molecular Biology Laboratory (**DNA mixtures**)

Apr. 26 (13) **Quiz #1** Analysis of DNA mixtures

May 3 (14) Student Presentations; Video, **Forensic DNA Statistics**

May 10 (15) Student Presentations; Video. (**Future Forensic DNA Trends**), Clean up.

Thursday May 17 2:00 Final Exam