Course Description:
This course covers history, scientific concepts, methods, practices, instrumentation, interpretation, statistics and court issues of forensic DNA analysis via lectures, hands-on activities/laboratories, and videos. Collection, documentation and preservation of biological evidence, bioethics, QA, validation, admissibility and training will also be covered.

Course Text and materials:
Required Texts:
Forensic Biology Laboratory Protocols. Steven Lee. Crime laboratory protocols (publicly available). Protocols will be handed out and utilized for laboratory and hands-on exercises.

Required reading and Internet materials:
Journal articles and other readings will be accessible at the SJSU library, on reserve or will be accessible on line. Citations and URLs for on line materials will be provided in assignments and on the greensheet. These will include:


Excellent On-Line Course at Rhodes College in Molecular Biology
http://www.rhodes.edu/biology/glindquester/molbiol/aboutcourse.html
http://www.rhodes.edu/biology/glindquester/molbiol/lectureschedule.html
Several pages within the course will be assigned as additional reading

Harvard DNA project: www.dnapolicy.net
President’s DNA Initiative: www.dna.gov


http://www.dnapolicy.net/depository/dhk__pubs__dna_identification_databases_2003_wisconsin_law_review.pdf
DOJ links: http://www.ojp.usdoj.gov/nij/sciencetech/dna_pub.htm:
Supplementary Texts (Optional)- Course material may include citations from the following:

Review Readings from:
Self-paced Review Material
- DNA as the Genetic Material C2
- Nature of Chemical Bonds- C3, 4
- Protein Structure C 5
- Structure of DNA and RNA C 6
(See Rhodes college page for review of topics on line)


Course Format:
The course will include lectures by the instructor and guest lectures including scientists from crime laboratories, hands-on laboratories and activities, discussions, videos, and small-group hands-on activities. If possible, on-line chats and a visit to a crime lab will be scheduled (TBA).

Course requirements:
Exams-350 points: Three exams will be given in this course. Exams will be cumulative and will include all material covered up to the date of the exam. Exams may include multiple choice, matching, true/false, short answer, diagrams, drawings and sketches, short essay and/or long essay. The final will be comprehensive. Exam 1 and exam 2 are both worth 100 points. The final is worth 150points

Exam 1: 03/05/07 Exam 2: 04/09/07 Final: 05/21/07 1215-1430
See: http://info.sjsu.edu/web-dbgen/narr/soc-spring/rec-592.html
For all final exam schedules

Quizzes and Small Group Activities-100 points
Quizzes on assigned readings, small group activities and other assigned materials will be given during the semester. These will generally be multiple choice, matching, true/false and short answer but may also include essay questions.

Hands-on Laboratory Assignments/Reports - 40 points
Laboratories will be held throughout the semester. These will include: Measurements and Error, Proper collection methods, Microscopy/Presumptive tests, DNA Extractions, Quantification of DNA, multiplex PCR amplification of STRs (autosomal and Y), PAGE vs CE, computer STR data analysis, Mt DNA amplification and sequence analysis, and moot court testimony. Written reports for each of the activities will be required (see general guidelines for reports below). During the semester, at least 1 report from
each team will be collected and reviewed. At the end of the semester all laboratory reports entered in notebooks will be collected. Participation will also be considered in the grades.

**Guidelines for Laboratory Reports:** All reports must contain the following sections: Abstract, Introduction, Materials and Methods, Results, Discussion with Conclusions, References, and Appendices with raw data. In general, documentation of all the activities should be complete enough so that an independent scientist could repeat all of the steps and understand the critical reasoning and analytical interpretation of the data and conclusions of your reports.

*All pages must be numbered, initialed and dated.* All materials must be firmly secured in the notebooks using a tape seal that has been initialed and dated over the seal and onto the paper (see the example).

![Tape securing document](image)

**Report Grading:** Reports will be graded using both administrative and technical criteria. Details of format and grading of the reports will be provided at the first laboratory.

Grading in general includes the following considerations:

- **Administrative Criteria- Approximately 1 point each per crime scene report**
  - Is the notebook bound (not spiral and no pages removed/loose) and are all crime scenes included?
  - Is the chain of custody completed for any evidence transfers and documented appropriately? Are proper citations and acknowledgements documented for other individual’s work (e.g. citations/references/teammates whole names)? Is the evidence, properly sealed and stored where indicated?
  - Is the documentation complete? Do the reports include notes, sketches and photographs? Are all pages numbered, dated and initialed? Is all data properly and securely inserted into the notebooks?
  - Where assigned, do the reports address the questions provided?
  - Are the reports organized with all sections? Is the writing clear and legible?

- **Technical and Scientific Criteria- Approximately 1 point each per lab report**
  - Are data tabulated/summarized and analyzed accurately?
  - Does the data support the statements in the reports?
  - Are the statements within the report and between team members consistent? If not, are discrepancies explained?
  - Is the technical detail provided sufficient for court and would the CSI be able to reconstruct the “crime scene” years from now, based on the documentation?
  - Are additional external references/citations utilized (those not provided in the class)?

**Participation point grading- 10 points**

For in class and laboratory participation, you will be able to earn 10 points. You will be graded on your participation. For “outstanding” participation, you will be awarded 9-10 points. These will be awarded to students who participate fully each week including being on time, completing all assigned work, actively participating in group activities, providing
several comments and questions during the activity/laboratory and on occasion, bringing to light additional information and references relevant to the topic.

For “good” participation, you will be awarded 6-8 points. This level will be achieved by those that are on time most of the time, completing nearly all assigned work, participating some in group activities and providing some comments and questions during the activities. “Fair” participation (some assigned work completed, a few comments or questions made, or students who participate considerably but arrive more than 15 minutes late or leave more than 15 minutes early or those missing 2-3 laboratory sessions) will be awarded 3-5 points. Minimal participation (very little completed work, almost no comments, consistently late arrival or early to leave) will be awarded 1-2 points. Students who are completely silent or are absent more than 4 times from laboratories will receive no participation points.

**Grading**

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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<tr>
<td>Quizzes/Activities</td>
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<td>Exam 1</td>
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<td>Exam 2</td>
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<tr>
<td>Laboratory notebooks</td>
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<tr>
<td>Participation</td>
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<tr>
<td>Final exam</td>
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</tr>
<tr>
<td><strong>Total required</strong></td>
<td>500</td>
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</table>

**Extra Credit** A total of 10 points may be granted for additional extra credit small group assignments and other assignments during the semester. Each assignment will be worth 1-2 points each. These extra credit points may be used to augment your final point total.

**Grading Policies**

Make-up exams will not generally be permitted. However, under extraordinary circumstances, with proper documentation and approval by the instructor, a 15 page single-spaced term paper of an instructor assigned topic, may substitute for 1 exam.

<table>
<thead>
<tr>
<th>Grade</th>
<th>From</th>
<th>To</th>
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<td>367</td>
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<tr>
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<td>467</td>
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**Instructor**

Professor Lee holds an MS from NYU and PhD from University of California, Berkeley in Molecular Biology. Lee holds several concurrent positions including a consulting position as Director of R&D at MiraiBio Inc. a small biotech company in Alameda, CA, Visiting Scholar at UC Berkeley, and holds adjunct professor appointments in Biological Sciences at San Francisco State University and Chemistry at Florida International University. He was formerly the Director of R&D at CA Dept of Justice DNA Laboratory from 1994-2000 where he served as an expert witness in DNA and conducted DNA training courses. He is a full member of the American Association for the Advancement of Science, American Academy of Forensic Sciences, the California Association of Criminalists, and is an American Society of Crime Laboratory Directors Laboratory Accreditation Board certified inspector. He also served on the FBI Technical Working Group on DNA Analysis Methods group from 1994-2000. He has taught courses in molecular biology at SFSU (1996-1998), Forensic genetics at UC Davis (1997), and most recently forensic DNA Typing of STRs at FIU (2003).
Academic Integrity

Academic integrity statement (from the Office of Student Conduct and Ethical Development):
“Your own commitment to learning, as evidenced by your enrollment at San José State University, and the University’s Academic Integrity Policy requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the Office of Student Conduct and Ethical Development. The policy on academic integrity can be found at http://sa.sjsu.edu/student_conduct.”

Additional information on Academic Integrity

Academic integrity is essential to the mission of San José State University. As such, students are expected to perform their own work (except when collaboration is expressly permitted by the course instructor) without the use of any outside resources. Students are not permitted to use old tests, quizzes when preparing for exams, nor may they consult with students who have already taken the exam. When practiced, academic integrity ensures that all students are fairly graded. Violations to the Academic Integrity Policy undermine the educational process and will not be tolerated. It also demonstrates a lack of respect for oneself, fellow students and the course instructor and can ruin the university’s reputation and the value of the degrees it offers. We all share the obligation to maintain an environment which practices academic integrity. Violators of the Academic Integrity Policy will be subject to failing this course and being reported to the Office of Judicial Affairs for disciplinary action which could result in suspension or expulsion from San José State University. The policy on academic integrity can be found at: http://sa.sjsu.edu/judicial_affairs/students/academic_integrity.html.

CHEATING:
At SJSU, cheating is the act of obtaining or attempting to obtain credit for academic work through the use of any dishonest, deceptive, or fraudulent means. Cheating at SJSU includes but is not limited to: Copying in part or in whole, from another’s test or other evaluation instrument; Submitting work previously graded in another course unless this has been approved by the course instructor or by departmental policy. Submitting work simultaneously presented in two courses, unless this has been approved by both course instructors or by departmental policy. Altering or interfering with grading or grading instructions; Sitting for an examination by a surrogate, or as a surrogate; any other act committed by a student in the course of his or her academic work which defrauds or misrepresents, including aiding or abetting in any of the actions defined above.

PLAGIARISM:
At SJSU plagiarism is the act of representing the work of another as one’s own (without giving appropriate credit) regardless of how that work was obtained, and submitting it to fulfill academic requirements. See Office of Student Conduct and Ethical Development at http://sa.sjsu.edu/student_conduct.
Plagiarism at SJSU includes but is not limited to: The act of incorporating the ideas, words, sentences, paragraphs, or parts thereof, or the specific substances of another’s work, without giving appropriate credit, and representing the product as one’s own work; and representing another’s artistic/scholarly works such as musical compositions, computer programs, photographs, painting, drawing, sculptures, or similar works as one’s own. All students are required to take the on-line tutorial and quiz on plagiarism: Go to: http://tutorials.sjlibrary.org/plagiarism/index.htm Take the quiz and print out your results You must complete this tutorial and print out your report at the end to hand in to the instructor.

Campus policy in compliance with the Americans with Disabilities Act:
“If you need course adaptations or accommodations because of a disability, or if you need special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with DRC to establish a record of their disability.”
### Tentative Course Schedule:

<table>
<thead>
<tr>
<th>Dates</th>
<th>Topics</th>
<th>Butler/*Inman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1:</td>
<td><strong>Overview of Forensic DNA typing and History of Forensic DNA</strong> C1/ C3&amp;C5</td>
<td></td>
</tr>
<tr>
<td>24 Jan 07</td>
<td>Handouts-Syllabus- Reading material</td>
<td>Safety/report guide</td>
</tr>
<tr>
<td></td>
<td>Introductions: Your background, my background</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Course Description, requirements, grading etc. Set up small student groups</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Assignment 1- Required reading:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visit the President's DNA Initiative Web site: <a href="http://www.dna.gov">http://www.dna.gov</a></td>
<td></td>
</tr>
</tbody>
</table>

**Laboratory:** Read Safety and laboratory format and grading handout

**Optional reading:**

1. The Human Genome Project and Beyond  
4. PBS links on DNA: [http://www.pbs.org/saf/1202/features/genelinks.htm](http://www.pbs.org/saf/1202/features/genelinks.htm)  
7. Introduction to DNA  
   [http://www.deakin.edu.au/forensic/Chemical%20Detective/DNA_Type.htm](http://www.deakin.edu.au/forensic/Chemical%20Detective/DNA_Type.htm)

### Week 2: Basics of Biological Physical Evidence

<table>
<thead>
<tr>
<th>Dates</th>
<th>Topics</th>
<th>Butler C3/In C1-C2</th>
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<tbody>
<tr>
<td>01/29</td>
<td><strong>Introduction to Physical Evidence</strong></td>
<td></td>
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</tbody>
</table>
|         | Common Types of Physical Evidence. - The Significance of Physical Evidence.  
|         | Locard's Exchange Principle- Class vs Individual Characteristics |                           |

**Laboratory:** Measurement and Errors: Measurements Impact angle calculations

<table>
<thead>
<tr>
<th>Dates</th>
<th>Topics</th>
<th><strong>Assignments- Required Reading:</strong></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Different types of biological physical evidence</td>
<td>Read all sub pages (all blue sub links in each of the sections): Crime Scene Integrity, Chain of Custody, Contamination of Evidence, Evidence Transportation and Storage, Sources and Locations of DNA Evidence</td>
</tr>
</tbody>
</table>

### Week 3: Identification of biological evidence: Intro to Detection and Screening methods

<table>
<thead>
<tr>
<th>Dates</th>
<th>Topics</th>
<th><strong>Assignments- Required Reading:</strong></th>
</tr>
</thead>
</table>
| 02/05   | **Biochemistry of biological evidence: blood, saliva, semen**  
|         | **Jones**  
|         | Introduction to screening methods **to be handed out.** |                                          |
Laboratory: Evidence screening  
Presumptive testing of blood, saliva and semen  
1. Visual and Microscopic examination  
2. Enhancement reagents and imaging to screen for biological fluids  
3. Sampling/Evaluation of Biological Evidence

Assignments: Required Reading


02/07
Biochemistry of biological evidence continued  
Butler C2 / Inman C4

New methods for detection of biological evidence

Introduction to fluorescence

Week 4

02/12
Collection and preservation of Biological Evidence  
Butler C3/InmanC2

Review – types of biological evidence
Collection methods for different types of evidence
Comparison of forensic biological evidence versus clinical samples.

Laboratory: Collection and preservation of biological evidence
Proper methods of collection. Special collection guidelines for Biological Evidence.
Laboratory comparison of collection methods and kits. Chain of custody and storage.

Take both training courses on What every law enforcement officer should know about DNA evidence- Selected pages will be assigned.

02/14

Laboratory: Collection and preservation of biological evidence continued
Proper methods of collection. Special collection guidelines for Biological Evidence.
Laboratory comparison of collection methods and kits. Chain of custody and storage.

Other collection devices
Swab drying chambers/CEPs/FTA paper
Temperature and tube comparisons for DNA storage and new collection substrates

Assignment: Required Reading: Collection and Preservation of Physical Evidence- 
Chain of Custody or *The Real CSI*

Special collection guidelines for Biological Evidence

Additional Optional Readings
Week 5  Biochemistry of DNA and Human Genetics: DNA Structure, Function and Replication, Cell Biology, Chromosomes, Genes and Forensic DNA markers DNA Biology- The Scientific Basis for DNA typing  

ButlerC2/InmanC4  

02/19  Introduction to DNA and Basic Human Genetics  
Scientific Basis for DNA typing - Why DNA?  
Intro to Deoxyribonucleic Acid: Central Dogma- DNA extraction  
Genetic Code, DNA Structure, Function and Replication  
Cell Biology, Chromosomes, Genes and DNA markers  

Laboratory: DNA extractions: Phenol chloroform vs. Chelex extractions- Differential extraction of male vs. female DNA from sexual assault evidence.  

02/21  Basic Human Genetics- A tribute to Mom and Dad  
Butler C 19  
Inheritance of DNA – Mendelian Genetics DNA variation and DNA Methods  
Web links for DNA biology  
http://www.geneed.com/demo/index.html - Go to Methods in Molecular biology- Go to the fundamentals- section 6- DNA/RNA structure  
http://www.blc.arizona.edu/Molecular_Graphics/DNA_Structure/DNA_Tutorial.HTML  

Video on forensic DNA  
(Lee will be at the American Academy of Forensic Sciences meeting)  

Week 6: Methods used in Forensic DNA: DNA extractions and quantification BC3/ IC5&C6  

02/26  DNA extractions- Types and amount of samples required for DNA typing  
DNA Extraction and Quantification or How do they get DNA?  
Overview of Typing- Methods used to isolate DNA and Quantify DNA How much DNA do they need? DNA from a Cougar- Whos’ DNA is it? Human or Non-human?  

Quantification of DNA : Non nucleic acid-based quantification methods  
Macroscopic and Microscopic examination  
Chemical and immunological methods  
Total genomic methods- DNA based  
Both intact and degraded  
UV Spectrophotometry  
Pico-green homogeneous microtitre plate assays  
Intact vs. Degraded DNA  
Agarose yield gel electrophoresis  
Human and higher primate specific methods – DNA based  
Both intact and degraded  
Slot Blot Hybridization using a D17Z1 probe  
AluQuant  
Intact vs. Degraded DNA  
Southern analysis of agarose yield gel-blots with D17Z1  
Real-time PCR, DNA-based human target specific methods  
Total human autosomal DNA  
Laboratory: DNA extractions and quantification- Agarose Gels/Plate assays  
Differential extraction of male vs. female DNA from sexual assault evidence and DNA quantification using agarose gel electrophoresis.  

02/28  Review for Exam 1: Student led reviews  
Butler C1-C3&19/ Inman C1-C6
Week 7: Exam 1

03/05 Exam 1 covering Butler C1-C3&19/ Inman C1-C6, URLs, journal articles, lab protocols and laboratory exercises that have been assigned, videos and any guest lecturers

Laboratory: Differential extraction of male vs. female DNA from sexual assault evidence and Real-Time PCR

03/07 Methods –Quantification of DNA- Butler C1&4/ Inman C6

Real-time PCR
Multiplex Real-Time PCR
   Intact vs. Degraded DNA
   End-point PCR DNA quantification
RNA based quantification methods
Sources of Variation in Quantification methods: DNA quantification standards
Interlaboratory studies on DNA quantification

Week 7: Methods used to assess DNA variation Butler C1&4/Inman C6

03/12 Restriction Fragment Length Polymorphisms, Polymerase Chain Reaction, Dideoxy sequencing, Denaturing High Performance Liquid Chromatography (dHPLC), Single Nucleotide Polymorphism Detection using array-based tech
Evaluating DNA variation or Does size matter?

Introduction to RFLP –
Laboratory: Restriction Digests - role of positive controls, negative controls
Electrophoresis in a Classroom

03/14 Introduction to Polymerase Chain Reaction – Who wants to be a DNA billionaire?
http://www.pcrlinks.com/generalities/introduction.htm

Week 8: Introduction to STR markers Butler C5,6&7/ Inman C6-C7

03/19 STRs- Short Tandem Repeats- CODIS loci
Laboratory: PCR amplification –positive controls, negative controls -STR amplification

03/21 Repeat Slippage, Mutation rates, Chromosomal abnormalities and consequences on Forensic STR results

Reading- Moxon et al 1999. Sci Amer. 280: 94 to be distributed
Web Link- www.cstl.nist.gov/biotech/strbase
Budowle et al. 2001. JFS 46:453-489 (CODIS STR Pop)
Additional Optional Readings

Week 9 Spring Break 03/26-03/30

Week 10: Data collection (instrumentation) and Interpretation C12-15/C6-C8

04/02 DNA separation methods- Gels vs Capillaries
STR detection methods - Introduction to Fluorescence
Web link- http://www.probes.com/servlets/publications?id=144
Laboratory: PAGE vs. CE: Introduction to the ABI 310, 3100 and FMBIO III plus

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04/04 Student Led Exam 2 Review

Week 11

04/09 Exam 2 Covering Butler C5-7, 12-17/Inman C6-8 URLs and journal articles lab protocols and laboratory exercises that have been assigned, videos and any guest lecturers
Laboratory: CE: ABI 310 set up and detection continued

04/11 Understanding STR results
Introduction to population statistics
Population Stats - Genetics- Hardy-Weinberg Equilibrium- Statistics of single source samples and mixtures-
Laboratory: Computer laboratory analysis of STR data. Genemapper ID and Image analysis

Week 12

04/16 Population Stats - Genetics- Hardy-Weinberg Equilibrium
Degraded DNA, PCR inhibition, contamination, Mixed samples and Interpretation
SWGDAM STR Interpretation Guidelines
Combined DNA Index System- Value of DNA databases
Levels of CODIS, Privacy Issues, QC, Searching, sample collection
Database Laws- Int’l DNA databases http://www.fbi.gov/hq/lab/codis/index1.htm
Assignments- Required Readings:
Computer laboratory: troubleshootingSTR results-forensic issues

04/18 Population Stats - Genetics- Hardy-Weinberg Equilibrium
Assessing the strength of the Evidence

Week 13: Databases, Cold Hits, and Unsolved crimes

04/23 DNA databases- Unsolved crimes -CHOP
Combined DNA Index System- Value of DNA databases - Levels of CODIS, Privacy Issues, QC, Searching, sample collection- DNA Database Laws- International DNA databases - Cold Hits/ Unsolved crimes Innocence Project- Uses of DNA in exonerating the innocent
· Summary CA Prop 69 Initiative Statute: Noble
· Judicature Genes and Justice. November-December 1999. 83 (3).
· CODIS http://www.fbi.gov/hq/lab/codis/index1.htm

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04/25

Forensic DNA database issues- Familial Searching, Privacy and Ethical Issues
Gender typing, Amelogenin and Y STRs or Is it a boy or a girl? Butler C 18, 20. 24

Assignments- Required Reading:

Additional reading: Spencer, C. Genetic Testimony: Questions About the Use, Collection, and Storage of DNA Profiles. How Many Profiles Are in the CODIS Databanks? Whose DNA Profile Should Be Included in DNA Databases? After Profiling and Electronic Storage of the Profile, Should the Tissue Sample Be Retained or Destroyed? Can Personal or Medical Information Be Obtained from DNA Profiles?

- Report of the National Task Force on Privacy, Technology, and Criminal Justice Information. 2001. NCJ 187669
- Ethical Legal and Social Issues Raised by the Human Genome Project Research (HGP)
- DNA and legal privacy issues
  http://www.dnafiles.org/resources/res07.html#cat5

Week 14

The “new” genetic markers- mtDNA and Y chromosome markers Butler C8-11

04/30

Mitochondrial DNA: Inheritance, heteroplasmy, ancient DNA, Armed Forces DNA Identification laboratory applications

Laboratory: Mitochondrial DNA sequencing laboratory or Y STR amplifications

05/02

Y chromosome markers Butler C 8 amd 9

Overview of Y chromosome characteristics
  Brief History of the Y chromosome
Forensic Applications
Other applications
Structure and Biology of the Y chromosome
Y polymorphisms- SNPS and STRs
Y databases

Week 15

Quality Control, Validation, Admissibility, and Training Standards ButlerCh 16, A IV & V, In10-11

05/07

Scientific and Technical Working Groups on DNA Analysis Methods
DNA Advisory Board (DAB), Validation and Accreditation
Optional Reading
Holt et al. 2002. JFS 47:15 TWGDAM Validation
Laboratory: DNA sequence interpretation, alignments, and comparison to Anderson sequence. Report writing and mtDNA statistics and/or Y STR result interpretation issues

05/09 Educational standards for Forensic DNA analysts and court issues
Admissibility Standards and Testimony
Inman C11
Frye, Daubert and Federal Rules of Evidence

Week 16 Legal/ethical considerations of DNA typing and Future of Forensic DNA In C 11
05/14 Legal/Ethical Considerations of DNA typing
See URLs
DNA and legal privacy issues
http://www.dnafiles.org/resources/res07.html#cat5
How DNA Technology Is Reshaping Judicial Process and Outcome
http://www.bc.edu/bc_org/avp/law/lwsch/journals/bciclr/24_2/05_FMS.htm
CAC Code of Ethics (on line at www.cacnews.org)

Laboratory: Court testimony exercise

05/16 Innocence Project- Uses of DNA in exonerating the innocent
Exonerating the wrongfully convicted through post conviction DNA testing
http://www.innocenceproject.org/
Convicted by Juries, Exonerated by Science- Case studies
http://www.ncjrs.org/pdffiles/dnaevid.pdf
Future of DNA typing- Forensic Phenotype Profiling
Future of DNA testing- MicroCE, SNPs, DNA arrays- Bead based methods, hand held???

Assignments: Required Reading:
- Small group discussion on Forensic Phenotype profiling
### Course Review for final exam Student Led Final Review- Final Exam: May 21, 2007

#### JS 196e Forensic Molecular Biology: Schedule at a glance:

<table>
<thead>
<tr>
<th>Week 1:</th>
<th>Overview of Forensic DNA typing and History of Forensic DNA</th>
<th>Butler C1/Inman C3&amp;C5</th>
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<tr>
<td>24 Jan 07</td>
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<th>Basics of Biological Physical Evidence</th>
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<td>01/29</td>
<td>Introduction to Physical Evidence</td>
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<td>01/31</td>
<td>Biological Physical Evidence</td>
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<th>Identification of biological evidence: Intro to Detection and Screening methods</th>
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<td>Biochemistry of biological evidence: blood, saliva, semen</td>
<td><strong>Butler C2 / Inman C4</strong></td>
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<td>02/12</td>
<td>Review –types of biological evidence</td>
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<tr>
<td>02/14</td>
<td>Laboratory: Collection and preservation of biological evidence continued</td>
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<tr>
<th>Week 5</th>
<th>Biochemistry of DNA and Human Genetics: DNA Structure, Function and Biology-</th>
<th>Butler C2/InmanC4</th>
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<tr>
<td>02/19</td>
<td>The Scientific Basis for DNA typing</td>
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<td>02/21</td>
<td>Basic Human Genetics- A tribute to Mom and Dad</td>
<td><strong>Butler C 19</strong></td>
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<tr>
<th>Week 6:</th>
<th>Methods used in Forensic DNA : DNA extractions and quantification</th>
<th>Butler C3/ Inman C5&amp;C6</th>
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<tbody>
<tr>
<td>02/26</td>
<td>DNA extractions- Types and amount of samples required for DNA typing</td>
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<tr>
<td>02/28</td>
<td>Review for Exam 1; Student led reviews</td>
<td><strong>Butler C1-C4&amp;19/ Inman C1-C6</strong></td>
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<tr>
<th>Week 7:</th>
<th>Exam 1</th>
<th>EXAM 1</th>
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<tbody>
<tr>
<td>03/05</td>
<td>Exam 1 covering Butler C1-C3&amp;19/ Inman C1-C6, URLs, journal articles, lab protocols and laboratories that have been assigned, videos and any guest lecturers</td>
<td></td>
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<tr>
<td>03/07</td>
<td>Methods –Quantification of DNA-</td>
<td><strong>Butler C1&amp;4/ InmanC6</strong></td>
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<tr>
<th>Week 7:</th>
<th>Methods used to assess DNA variation</th>
<th>Butler C1&amp;4/Inman C6</th>
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<tbody>
<tr>
<td>03/12</td>
<td>Restriction Fragment Length Polymorphisms, Polymerase Chain Reaction, Dideoxy</td>
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<tr>
<td>03/14</td>
<td>Introduction to Polymerase Chain Reaction – Who wants to be a DNA billionaire?</td>
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<tr>
<th>Week 8:</th>
<th>Introduction to STR markers</th>
<th>Butler C5,6&amp;7/ InmanC6-C7</th>
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<tbody>
<tr>
<td>03/19</td>
<td>STRs- Short Tandem Repeats- CODIS loci</td>
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<tr>
<td>03/21</td>
<td>Repeat Slippage, Mutation rates, Chromosomal abnormalities</td>
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<tr>
<th>Week 9</th>
<th>Spring Break</th>
<th>03/26-03/30</th>
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<tr>
<th>Week 10:</th>
<th>Data collection (instrumentation) and Interpretation</th>
<th>Butler C12-15/ Inman C6-C8</th>
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<tbody>
<tr>
<td>04/02</td>
<td>DNA separation methods- Gels vs Capillaries</td>
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<tr>
<td>04/04</td>
<td>Student Led Exam 2 Review</td>
<td><strong>Butler C5-7, 12-15/Inman C6-8</strong></td>
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<tr>
<th>Week 11:</th>
<th>Exam 2</th>
<th>EXAM 2</th>
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<tbody>
<tr>
<td>04/09</td>
<td>Exam 2 Covering Butler C5-7, 12-17/Inman C6-8 URLs and journal articles lab</td>
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<tr>
<td>04/11</td>
<td>Understanding STR results</td>
<td><strong>Butler C18-19&amp; C7/ InmanC4&amp;C8</strong></td>
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<tr>
<th>Week 12:</th>
<th>Understanding STR results, Forensic Issues &amp; DNA Databases</th>
<th>Butler C7, 19-21&amp; C7/In C4&amp;C8</th>
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<tbody>
<tr>
<td>04/16</td>
<td>Population Stats - Genetics- Hardy-Weinberg Equilibrium</td>
<td><strong>Butler19-21/IC8</strong></td>
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<td>04/18</td>
<td>Population Stats - Genetics- Hardy-Weinberg Equilibrium</td>
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<td>Week 13</td>
<td>DNA databases- Unsolved crimes -CHOP</td>
<td>Butler 18, 20, 24 /Inman C9</td>
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<tr>
<td>04/23</td>
<td>DNA databases- Unsolved crimes -CHOP</td>
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<td>04/25</td>
<td>Forensic DNA database issues- Familial Searching, Privacy and Ethical Issues</td>
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<td>Gender typing, Amelogenin and Y STRs or Is it a boy or a girl?</td>
<td>Butler C 18, 20 and24/Inman C9</td>
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<td>Week 14</td>
<td>The “new” genetic markers- mtDNA and Y chromosome markers</td>
<td>Butler chapters 8-11</td>
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<tr>
<td>04/30</td>
<td>Mitochondrial DNA: Inheritance, heteroplasmy, ancient DNA, Armed Forces DNA Identification laboratory applications</td>
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<tr>
<td>05/02</td>
<td>Y chromosome markers</td>
<td>ButlerC 8 and 9</td>
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<td>Week 15</td>
<td>Quality Control, Validation, Admissibility, and Training Standards</td>
<td>ButlerCh 16, A IV&amp;Y, In10-11</td>
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<tr>
<td>05/07</td>
<td>Scientific and Technical Working Groups on DNA Analysis Methods</td>
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<tr>
<td>05/09</td>
<td>Educational standards for Forensic DNA analysts and court issues</td>
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<td>Week 16</td>
<td>Legal/ethical considerations of DNA typing and Future of Forensic DNA</td>
<td>In C 11 See URLs and Inman C 11</td>
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<tr>
<td>05/14</td>
<td>Legal/Ethical Considerations of DNA typing</td>
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<tr>
<td>05/16</td>
<td>Innocence Project- Uses of DNA in exonerating the innocent</td>
<td>Future of DNA typing- Forensic Phenotype Profiling</td>
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<td>05/21</td>
<td>Final Exam- Comprehensive 1215-1430</td>
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