

San Jose State University
Department of Justice Studies

FS 160 DNA and Crime (Fall 2014 Section 01 Class number 49047)

General Class Information:

Instructor:	Jeremiah Scott Garrido
Office Location:	Office Campus
Telephone:	408-375-2887
Email:	scenetolab@gmail.com
Office Hours:	Wednesday (following class, set by appointment via email)
Class Days/Time:	Wednesday / 5:30pm – 8:15pm
Classroom:	MacQuarrie Hall 526

Course Description:

This course is designed to introduce students to the basics of biological evidence and the application of DNA analysis to solving crime. ***The focus of this class will be on biological evidence from the crime scene to the crime laboratory to the courtroom.*** During the initial stages of this course students will be introduced to methods of detecting biological material at the crime scene and upon the examination of physical evidence in the crime laboratory setting. Following the detection of biological material, the remainder of the course will then focus on DNA testing and how it is utilized in criminal casework and convicted offender DNA databases. Students will become familiar with the scientific concepts, methods, practices and analytical instrumentation utilized for DNA analysis. Legal issues including national standards for quality assurance, validation, legal admissibility and training will also be covered.

Course Text and materials:

Required Texts:

- ***Fundamentals of Forensic DNA Typing.*** John Butler 2010. ISBN 9780123749994. Academic Press

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. *These will include the following below.*

Required reading and internet materials:

- **Weekly outlines** made by the instructor and distributed (posted on Canvas) based on the Supplementary Texts - ***Criminalistics: An Introduction to Forensic Science***, 11th ed. (2014)[10th ed. or 9th may also be used]. Saferstein, Richard. Prentice Hall Education, Career & Technology, Englewood Cliffs, New Jersey. ISBN13: 978-0133458824. ISBN10: 0133458822. <http://vig.prenhall.com/catalog/academic/product/0,1144,0132216558,00.html>
- President's DNA Initiative: www.dna.gov : Now found at <http://www.nij.gov/training/courses/welcome.html>
- STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES A PATH FORWARD 2009. NRC - http://books.nap.edu/openbook.php?record_id=12589&page=R1
- NIST STRBase: <http://www.cstl.nist.gov/div831/strbase/index.htm>

Supplementary Texts (Optional)- Course material may include citations from the following:

- ***Criminalistics: An Introduction to Forensic Science***, 11th ed. (2014)[10th ed. may also be used]. Saferstein, Richard. Prentice Hall Education, Career & Technology, Englewood Cliffs, New Jersey. ISBN13: 978-0133458824. ISBN10: 0133458822. <http://vig.prenhall.com/catalog/academic/product/0,1144,0132216558,00.html>

- **Genetic Testimony. A guide to forensic DNA profiling.** Spencer, C. 2004. ISBN 0-13-142338-X. Pearson Education Inc. Upper Saddle River, NJ 07458. 37 pp.
- **Techniques of Crime Scene Investigation, Seventh Edition. 2004** Barry Fisher. ISBN084931691X, 544 pages. CRC Press
- **The Evaluation of Forensic DNA Evidence Committee on DNA Forensic Science: An Update, National Research Council 272 pages, 6 x 9, 1996, ISBN 0-309-05395-1 National Academies Press- Available on-line for free- <http://books.nap.edu/catalog/5141.html>**

Course Format:

- The course will include **lectures by the instructor and guest lectures** including scientists from crime laboratories. **Discussions, videos, and small-group hands-on activities**, will also be included throughout the semester. If possible, on-line chats will be scheduled (TBA).

Course requirements:

Exams - 400 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 200 points.

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.

Grading:

Quizzes/Activities	100 points;
Exam 1	100 points;
Exam 2	100 points;
Final exam	200 points;
Total required	500 points.

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.

Grading Scale (plus/minus)

From -To	Grade
483.5-500	A plus
467-483.4	A
450-466.9	A minus
433.5-449.9	B plus
417-433.4	B
400-416.9	B minus
383.5-399.9	C plus
367-383.4	C
< 367	F

Instructor:

Jeremiah Garrido is currently a Criminalists/DNA Analyst assigned to the Forensic Biology Unit of the Santa Clara County Crime Laboratory. He has approximately 15 years of forensic science experience. Jeremiah's primary duties at the Crime Laboratory include assisting police agencies in processing crime scenes for physical evidence, examining physical evidence for the presence of biological fluids, performing forensic DNA analysis and providing expert witness testimony in court. Jeremiah holds a BS in Forensic Science and a BS in Chemistry from the University of New Haven in Connecticut.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. Information on add/drops are available at <http://www.sjsu.edu/advising/faq/index.htm#add>. Information about late drop is available at <http://www.sjsu.edu/aars/policies/latedrops/>. Students should be aware of the current deadlines and penalties for adding and dropping classes.

JUSTICE STUDIES READING AND WRITING PHILOSOPHY

The Department of Justice Studies is committed to scholarly excellence. Therefore, the Department promotes academic, critical, and creative engagement with language (i.e., reading and writing) throughout its curriculum. A sustained and intensive exploration of language prepares students to think critically and to act meaningfully in interrelated areas of their lives—personal, professional, economic, social, political, ethical, and cultural. Graduates of the Department of Justice Studies leave San José State University prepared to enter a range of careers and for advanced study in a variety of fields; they are prepared to more effectively identify and ameliorate injustice in their personal, professional and civic lives. Indeed, the impact of literacy is evident not only within the span of a specific course, semester, or academic program but also over the span of a lifetime.

*University Policies***Academic integrity**

Students should know the University's Student Conduct Code, available at http://www.sjsu.edu/studentconduct/docs/Student_Conduct_Code.pdf. Your own commitment to learning, as evidenced by your enrollment at San Jose State University and the University's integrity policy, require 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, found at <http://www.sjsu.edu/studentconduct>.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include in your assignment any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy F06-1 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make 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 the DRC (Disability Resource Center) to establish a record of their disability.

Accommodation of Religious Creed

In compliance with Education code, Section 89320, it is the official policy of the Justice Studies Department of San Jose State University to permit any student to undergo a test or examination, without penalty, at a time when that activity would not violate the student's religious creed, unless administering the examination at an alternative time would impose an undue hardship that could not reasonably have been avoided. Requests to accommodate a student's religious creed by scheduling tests or examinations at alternative times should be submitted directly to the faculty member responsible for administering the examination by the second week of the semester.

Reasonable common sense, judgment and the pursuit of mutual goodwill should result in the positive resolution of scheduling conflicts. The regular campus appeals process applies if a mutually satisfactory arrangement cannot be achieved.

Student Technology Resources (Optional)

Computer labs for student use are available in the Academic Success Center located on the 1st floor of Clark Hall and on the 2nd floor of the Student Union. Additional computer labs may be available in your department/college. Computers are also available in the Martin Luther King Library.

A wide variety of audio-visual equipment is available for student checkout from Media Services located in IRC 112. These items include digital and VHS camcorders, VHS and Beta video players, 16 mm, slide, overhead, DVD, CD, and audiotape players, sound systems, wireless microphones, projection screens and monitors.

Learning Assistance Resource Center (Optional)

The Learning Assistance Resource Center (LARC) is located in Room 600 in the Student Services Center. It is designed to assist students in the development of their full academic potential and to motivate them to become self-directed learners. The center provides support services, such as skills assessment, individual or group tutorials, subject advising, learning assistance, summer academic preparation and basic skills development. The LARC website is located at <http://www.sjsu.edu/larc>.

SJSU Writing Center (Optional)

The SJSU Writing Center is located in Room 126 in Clark Hall. It is staffed by professional instructors and upper-division or graduate-level writing specialists from each of the seven SJSU colleges. Our writing specialists have met a rigorous GPA requirement, and they are well trained to assist all students at all levels within all disciplines to become better writers. The Writing Center website is located at <http://www.sjsu.edu/writingcenter>.

Peer Mentor Center (Optional)

The Peer Mentor Center is located on the 1st floor of Clark Hall in the Academic Success Center. The Peer Mentor Center is staffed with Peer Mentors who excel in helping students manage university life, tackling problems that range from academic challenges to interpersonal struggles. On the road to graduation, Peer Mentors are navigators, offering “roadside assistance” to peers who feel a bit lost or simply need help mapping out the locations of campus resources. Peer Mentor services are free and available on a drop –in basis, no reservation required. The Peer Mentor Center website is located at <http://www.sjsu.edu/muse/peermentor>.

CASA Student Success Center

The Student Success Center in the College of Applied Sciences and Arts (CASA) provides advising for undergraduate students majoring or wanting to major in programs offered in CASA Departments and Schools.

All CASA students and students who would like to be in CASA are invited to stop by the Center for general education advising, help with changing majors, academic policy related questions, meeting with peer advisors, and/or attending various regularly scheduled presentations and workshops. Looking for academic advice or maybe just some tips about how to navigate your way around SJSU? Check out the CASA Student Success Center! It’s also a great place to study, and you can check out laptops.

Location: MacQuarrie Hall (MH) 533 - top floor of MacQuarrie Hall. Contact information: [408.924.2910](tel:408.924.2910). Website: <http://www.sjsu.edu/casa/ssc/>.
more information.

Tentative Course Schedule:

Dates	Topics	Butler/Outline
Week 1: Introduction / Overview of DNA and the Crime Laboratory		(outline only)
08/27	Handouts-Syllabus- Reading material Introductions: Your background, my background Course Description, requirements, grading etc. Set up small student groups Overview of Forensic Science, the Crime Lab and Impact of Biological Evidence/DNA on Criminal/Civil Cases <i>Assignment 1- Visit the following site- History of forensic DNA</i> http://www.dna.gov/basics/analysishistory/	
Week 2: The Crime Scene / Physical Evidence		(outline only)
09/03	Introduction to Physical Evidence <ul style="list-style-type: none">●Common Types of Physical Evidence. - The Significance of Physical Evidence.●Locards Exchange Principle- Class vs Individual Characteristics Biological Physical Evidence http://www.crime-scene-investigator.net/ http://www.profiling.org/journal/vol11_no1/jbp_ed_january2000_1-1.html Collection and Preservation of Physical Evidence- Chain of Custody or <i>The Real CSI</i> <ul style="list-style-type: none">●Special collection guidelines for Biological Evidence http://www.cci.ca.gov/Reference/biosmpl.pdf Screening samples- Serology, Microscopy, Fluorescence or <i>Where is the DNA?</i> DNA in criminal cases: Contact DNA, Blood, Semen, Saliva Bloodstain Pattern Interpretation Additional Optional Readings Kobilinsky, L. 1992. Recovery and Stability of DNA in Samples of Forensic Science Significance. Forensic Sci. Rev. 4. 67. Gialamas, D and Stockwell, D. 1995. Forensic Biology Sample Collection and Handling Techniques. A Look at Methods Utilized by California Crime Labs CAC News Summer 1995.	
Week 3 Screening Tests, Collection and Preservation of Biological Evidence and Intro to DNA		C1-C3 /outline
09/10	Biological Evidence Collection <u>DNA Biology- The Scientific Basis for DNA typing</u> Scientific Basis for DNA typing - <i>Why DNA?</i> Intro to Deoxyribonucleic Acid: Central Dogma- DNA extraction Genetic Code, DNA Structure, Function and Replication Cell Biology, Chromosomes, Genes and DNA markers Basic Human Genetics- <i>A tribute to Mom and Dad</i> Inheritance of DNA – Mendelian Genetics DNA variation and DNA Methods Sampling/Evaluation of Biological Evidence and DNA extraction <hr/> Types and amount of samples required for DNA typing References- www.fbi.gov/programs/lab/fsc/backissu/july1999/ponce.htm <ul style="list-style-type: none">●Cox, M. 1991. A Study of the Sensitivity and Specificity of Four Presumptive Tests for Blood. <i>Journal of Forensic Science</i> 36(5) 1503-1511 DNA Extraction and Quantification or <i>How do they get DNA?</i> Overview of Typing- Methods used to isolate DNA and Quantify DNA <i>How much DNA do they need?</i> DNA from a Cougar- <i>Whos' DNA is it? Human or Non-human?</i> Assignment: Visit www.dna.gov - http://www.dna.gov/basics/evidence_collection and Basic Biology of DNA http://www.dna.gov/basics/biology/ Read all subpages (all blue sublinks in each of the sections):Crime Scene Integrity, Chain of Custody, Contamination of Evidence, Evidence Transportation and Storage, Sources and Locations of DNA Evidence.	

9/17 **Introduction to Biochemistry of DNA**
Web links for DNA biology
www.dna.gov

Collecting DNA Evidence at Property Crime Scenes- Includes four modules focusing on DNA evidence from property crime scenes: 1) Types of Evidence, 2) Crime Scenes, 3) Evidence Collection and 4) Combined DNA Index System (CODIS).

- First Responding Officers—What Every Law Enforcement Officer Should Know About DNA Evidence- Focuses on issues that arise for the first-responding law enforcement officer during the identification, preservation, and collection of DNA evidence at a crime scene.
- Investigators and Evidence Technicians—What Every Law Enforcement Officer Should Know About DNA Evidence- Delivers indepth information for the investigating officer or evidence technician on the identification, preservation, and collection of DNA evidence at a crime scene.
- Introduction to DNA Structure- A Molecular Graphics companion to an Introductory Course in Biology or Biochemistry. Copyright 1995, Richard B. Hallick. All rights reserved**
- http://www.blc.arizona.edu/Molecular_Graphics/DNA_Structure/DNA_Tutorial.HTML

Study for EXAM 1

Week 5: EXAM 1 Butler C1-C3/ Instructor Outlines
 9/24

Week 6: PCR C4
 10/1 **Introduction to Polymerase Chain Reaction – *Who wants to be a DNA billionaire?***
<http://www.pcrlinks.com/generalities/introduction.htm>
<http://www.accessexcellence.org/RC/VL/GG/polymerase.html>

Week 7: PCR C4
 10/08 **Polymerase Chain Reaction Continued**
 Historical review of PCR genetic markers

Week 8: PCR and qPCR C4
 10/15 **Polymerase Chain Reaction Continued**
Quantitative PCR
 Online materials and tutorials

Week 9: Introduction to STRs and Forensic Issues C5-6
 10/22 **Biology of STRs**
Commonly used autosomal STRs, Biology of STRs
 Abnormalities and consequences on Forensic STR results
Web Link- www.cstl.nist.gov/biotech/strbase

Budowle et al. 2001. JFS 46:453-489 (CODIS STR Pop)
Additional Optional Readings
 Walsh et al. 1996 NAR. 24:2807-2812, Levinson et al. 1987. Mol Biol Evol. 4:203-221, Brinkmann. 1998 Am J Hum Genet 62:1408, Henke et al. Am J Hum Genet 64:1473.

Week 10: Data collection (instrumentation) and Interpretation C12-C14
 10/29 DNA separation methods- Gels vs Capillaries
 STR detection methods - Introduction to Fluorescence
Exam 2 Review Butler C5-6, 12-14

Week 11	Exam 2	Butler C5-6, 12-14
11/5	Exam 2 Covering Butler C5-6, 12-14/ journal articles that have been assigned, videos and any guest lecturers	
Week 12	Understanding STR results, Forensic Issues& DNA Databases	C18-19& C7
11/12	Single Source vs. Mixtures SWGAM STR Interpretation Guidelines / Statistical Models for STR samples -Likelihood Ratio, Random Match Probability, Combined Probability of Inclusion -Database Match Probability	
Week 13	Understanding STR results, Forensic Issues& DNA Databases	C18-19& C7
11/19	Population Stats - Genetics- Hardy-Weinberg Equilibrium Degraded DNA, PCR inhibition, contamination, Mixed samples and Interpretation SWGAM STR Interpretation Guidelines / Statistical Models for STR samples -Likelihood Ratio, Random Match Probability, Combined Probability of Inclusion -Database Match Probability http://www.fbi.gov/about-us/lab/codis/swgdam.pdf/view Combined DNA Index System- Value of DNA databases C8-10 Levels of CODIS, Privacy Issues, QC, Searching, sample collection Database Laws- Int'l DNA databases http://www.fbi.gov/about-us/lab/codis/codis/ Cold Hits, Unsolved crimes, other markers DNA databases- Unsolved crimes -CHOP Forensic DNA database issues- Familial Searching, Privacy and Ethical Issues Gender typing, Amelogenin and Y STRs or Is it a boy or a girl? C8-11 The "new" genetic markers- mtDNA and SNPs Y Chromosome Markers	
Week 14	No Classes Thanksgiving	
	11/26	
Week 15	Quality Control, Validation and Training Standards	Journal articles TBA
12/03	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 Educational standards for Forensic DNA analysts Admissibility Standards and Testimony Frye, Daubert and Federal Rules of Evidence http://www.forensic-evidence.com/site/EVID/EL00003_4.html STR admissibility link- http://www.denverda.org/DNA/DNA_INDEX.htm Legal/Ethical Considerations of DNA typing and Future See URLs DNA and legal privacy issues http://www.dnfiles.org/programs/law-genetics-identity Ethics of Genetic Testing- http://www.nhgri.nih.gov/12010621 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 ●Innocence Project- Uses of DNA in exonerating the innocent Exonerating the wrongfully convicted through postconviction DNA testing http://www.innocenceproject.org/ Convicted by Juries, Exonerated by Science- Case studies http://www.ncjrs.org/pdffiles/dnaevid.pdf Justice Project www.thejusticeproject.org/national/solution/expanding-post-conviction-dna-testing/ Truth in Justice http://truthinjustice.org/	

National Clearinghouse for Science, Technology
and the Law
www.ncstl.org

<http://ag.ca.gov/publications/finalproof.pdf>
www.pbs.org/newshour/bb/law/july-dec10/deathrow_10-13.html
<http://www.facebook.com/posted.php?id=158307684189820#!/pages/Duquesne-University-School-of-Law-Post-Conviction-DNA-Clinic/158307684189820?v=wall>
<http://www.johntfloyd.com/blog/2010/09/28/actual-innocence-in-post-conviction-proceedings/>

Week 16 **Future of DNA typing: Last Class**

12/10

Future of DNA testing- MicroCE, SNPs, DNA arrays- Bead based methods, hand held rapid DNA and Next Generation Sequencing

http://www.ojp.usdoj.gov/nij/pdf/dna_studyreport_final.pdf

Forensic DNA profiling, Familial Searches of databases, Errors and Ethical issues

<http://dna-view.com/papers.htm>- Brenner CH, Bieber FR, Lazer D (2006June2) [Finding Criminals Through DNA of Their Relatives](#) *Science* : Brenner CH (1997) [Probable Race of a Stain Donor](#), *Proceedings from the Seventh Human Identification Symposium*, Promega Corp 48-52

http://www.stlr.org/html/Staff_archive/KoopsSchellekens/Source_List+SourceUpload+3+0/Source_011.pdf

Houston PD crime lab error reports- <http://www.hpdlabinvestigation.org/> NAS Report

Course Review for final exam

Final Exam: TBD