San José State University
Department of Justice Studies
Special Topics in Forensic Science - DNA and Crime (Seminar)
FS 160: Course Number 49886, Section 81, Fall 2019

Course and Contact Information

Instructor:	Dr. Steven Lee
Office Location:	MH 528. On line for appointments set by email.
Telephone:	408-924-2048. Best way to contact me is by email.
Email:	steven.lee@sjsu.edu
Office Hours:	**Mondays 8:00-09:00 am online.** Setting up appointments by email is preferred however you may contact me during in person hours listed above. Note that hours may be moved to accommodate meetings and students will be notified by posting. Preferred to set by appointment via email to steven.lee@sjsu.edu with subject "office hour request" as this way you won't need to wait for meetings with other students.
Class Days/Time:	Classes, quizzes and exams are all delivered on line by recorder lectures, email, canvas and other distance learning modalities. PowerPoints as web recordings will be available each week. Email, Canvas and WebEx capable computer or laptops are required. Official class day is Monday. First class will be held on line second week of classes, Monday August 26th , 2019. The course website: https://sjsu.instructure.com/courses/1322474
Classroom:	The syllabus and canvas site contains the majority of all course readings, weblinks, videos, quizzes, exams and more. The course is offered through the canvas website link provided above.

Course Format

The course will be delivered on-line. The midterm and final will be administered on line on the following dates: Monday 14 October 2019 and Thursday December 12th- You must be available to take these two on line exams. Two scheduled quizzes will also be delivered on line Monday October 7th and Monday December 9th. You must be available to take these quizzes on line on these two days as well. Additional on line activities, quizzes and assignments will be announced on line.

Faculty Web Page and Email checking

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on my faculty web page at http://www.sjsu.edu/people/steven.lee/courses/c2/index.html course website. The course is also being actively migrated to canvas. You are responsible for regularly checking with your email to learn of any updates.

Course Description

Range of topics in Forensic Science which will vary by semester. Topics may include Blood Spatter Analysis, Microscopy and Trace Evidence, Forensic Art, Facial Reconstruction, and others. Repeatable for up to 9 units credit when content changes. Prerequisite: JS 10, FS 11, ANTH 157 Recommended or Instructor Permission. Justice Studies or Forensic Science major; Justice Studies minor.

This course is designed to introduce students to the basics of DNA and the application of DNA to solving crime. Students will be introduced to DNA testing 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.
Note: Must achieve a grade of "C" or better to fulfill Justice Studies major requirements.

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

1. CLO1. Describe the highlights of the history and development of DNA laboratory techniques
2. CLO2. Explain the screening and confirmatory tests for the presence of biological evidence
3. CLO3. Select the different types of analyses to utilize for different amounts of biological evidence types
4. CLO4. Describe the scientific principles behind DNA techniques including PCR and design best practices for detecting and reducing contamination
5. CLO5. Provide descriptions of the current forensic DNA controls, quality assurance, standards, educational requirements and testimony utilized by accredited forensic DNA laboratories

Module Learning Outcomes (MLO)

The course is structured in 3 Modules

Module 0: Getting Started, Course and Syllabus Overview, On line course resources

Module 1: History of DNA Methods, Biological Evidence and Screening, Extraction and Quantification of DNA

Module 2: RFLP, PCR, STRs, detection, mixtures, interpretation, forensic issues, stats, databases, NGS, future

Module 1 Learning Outcomes: See MLOs listed with corresponding assignments in the schedule

1. MO 1.1: Summarize the historical milestones in the development of forensic DNA technology (CLO1)

2. MO 1.2: Identify the major individual scientists and their contributions to DNA technology (CLO 1)

3. MO 1.3: Distinguish screening from confirmatory testing of biological samples (CLO 2)

4. MO 1.4: Predict the outcome of the application of screening and confirmatory tests under different conditions (low template, degradation, inhibition, contamination -CLO 2 and CLO 3)

5. MO 1.5: Identify three quantification strategies to detect and and three ways to overcome poor results due to low template and/or degradation, inhibition or contamination (CLO2, 3 and 4)

6. MO 1.6: Describe three different types of controls used in screening, extraction and quantification to test hypotheses (CLO 4 and 5)

Module 2 Learning Outcomes : See MLOs listed with corresponding assignments in the schedule

1. MO 2.1: Summarize the differences between RFLP and PCR (CLO1)
2. MO 2.2: Describe five advantageous characteristics of STRs (CLO 1)
3. MO 2.3: Identify three characteristics you may observe in an STR result that indicates a mixture of 2 individuals
4. MO 2.4: Predict the outcome of the application of DNA STR testing under different conditions (low template, degradation, inhibition, contamination -(CLO2, 3 and 4)
5. MO 2.5a: Describe 3 characteristics to distinguish a true DNA STR allele from an artifact (CLO 4 and 5)
6. MO 2.5b: Calculate the probability of a specific genotype for a single genetic marker
7. MO 2.6: Define next generation sequencing and name 3 applications of NGS (CLO 4 and 5)

Required reading and Internet materials:
Textbook

Fundamentals of Forensic DNA Typing. John Butler 2010. ISBN 9780123749994. Academic Press.
The book is available on line in our SJSU library website at the following link:
https://sjsu-primo.hosted.exlibrisgroup.com/primo-explore/fulldisplay?docid=01CALS_ALMA71476600890002901&context=L&vid=01CALS_SJO&lang=en_US

For copies of the book figures and slides go here:
https://booksite.elsevier.com/9780123749994/

Thank you to Ms. Adriana Poo & Ms. Christa Bailey TEAM Co-Coordinators for facilitating the access to the ebook for all students and staff.

Other Readings

Forensic DNA Analysis. Rudin, N. and K. Inman. 2nd Edition. 2001. ISBN: 0849302331 Publisher: CRC Press; 2nd edition (December 21, 2001) 312 pp.

Advanced Topics in Forensic DNA Typing Methodology. John Butler 2012. ISBN 978012374513-2. Academic Press (http://220.163.113.53/G2S/eWebEditor/uploadfile/20130416175005_315599781486.pdf

Forensic DNA Typing: Biology and Technology Behind STR Markers John Butler PhD. 2005. ISBN: 0-12-147952-8, 688pp. Academic Press

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:

1. DNA training courses http://www.nij.gov/training/courses/welcome.htm
2. President's Council of Advisors on Science and Technology (2016) Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison
3. Methods.https://www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_ final.pdf
4. National Academy of Sciences. (2009) Strengthening Forensic Sciences in the US: A Path Forward. https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf
5. NIST STRBase:

   http://www.cstl.nist.gov/div831/strbase/index.htm NCJRS

   publications - http://www.ncjrs.org/forensic/publications.html-

   http://www.ojp.usdoj.gov/nij/sciencetech/dna_pub.htm :
6. Human Genome Project Links- http://www.ornl.gov/sci/techresources/Human_Genome/elsi/forensics.shtml: and others
7. http://www.forensic.to/links/pages/Forensic_Sciences/Field_of_expertise/D

   NA/ : http://www.mass.gov/cpcs/links/,

8. Genetic Witness: Forensic Uses of DNA Testing, Office of Technology Assessment; http://www.wws.princeton.edu/~ota/disk2/1990/9021/9021.PDF

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

10. 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.

11. Criminalistics: An Introduction to Forensic Science (College Version), 9/E, Copyright 2007, ISBN-0132216558, RE. Saferstein, Ph.D, Prentice Hall, 672pp. http://vig.prenhall.com/catalog/academic/product/0,1144,0132216558,00.html

12. Techniques of Crime Scene Investigation, Seventh Edition. 2004 Barry Fisher. ISBN084931691X, 544 pages. CRC Press

13. The Evaluation of Forensic DNA Evidence Committee on DNA Forensic Science: An Update, National Research Council 272 pages, 6 x 9, 1996, ISBN 0-309-05395-1National Academies Press- Available on-line for free- http://books.nap.edu/catalog/5141.html

Library Liaison

Silke Higgins, silke.higgins@sjsu.edu, (408) 808-2118
http://libguides.sjsu.edu/justicestudies

Course Requirements and Assignments

Please be sure to review the following on sources and policies:

- University Syllabus Policy S16-9 at http://www.sjsu.edu/senate/docs/S16-9.pdf.
- Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practical. Other course structures will have equivalent workload expectations as described in the syllabus.

Midterm and Final

The midterm will be provided on line Monday 14 October. The final will be provided to you on line Thursday December 12th . You should plan on being available for both of these.
No make up exams are permitted. In extreme emergencies (with a doctor's note on letterhead, signed and sealed), a 20 page single spaced paper on a research topic (Topic TBD) with 50 citations may be substituted on a case-by-case basis with pre approval from the instructor.

Exam format:
a. 70-80% Short Answer = Multiple choice, fill in, matching, true/false with explanations: Factual
b. 10-15% Short Essay= 1-2 paragraph or diagrammatic critical thinking questions with application of your knowledge
c. 10-15% Essay= ½ page answers with critical thinking questions

Additional Assignments and Quizzes

Additional assignments will be required as well as short answer quizzes.
Two scheduled quizzes will also be delivered on line Monday October 7th and Monday December 9th . Assignments (including journal articles and book chapter readings as well as activities) will also be required for completion on line, on time (see the end of this syllabus for assigned readings and URLs).

Grading:

Quizzes/Activities	100 points;
Midterm Exam	200 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 Policy

Make-up exams will not generally be permitted. However, under extraordinary circumstances, with proper documentation and approval by the instructor, a 20 page single-spaced term paper of an instructor assigned topic, may substitute for 1 exam (with 50 recent journal citations).

On line late grading policies
Each minute that you are late in emailing any assignment including, quizzes, assignments and exams (midterm and final) back, 10% will be deducted from your grade, so for example, if you are late by 1 minute, the highest grade you can achieve would be 90%. If you are 2 minutes late, the highest grade you can achieve would be 80% etc.

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

Note that "All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades." See University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

Classroom Protocol

All students are expected to participate professionally in on line attendance and in group activities, be on time for all assignments and to use best practices for on line attendance (such as keeping your phone muted to reduce background noise and be attentive to respond promptly when requested).

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

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. If you are looking for academic advice or even tips about how to navigate your way around SJSU, check out the CASA Student Success Center. Location: MacQuarrie Hall (MQH) 533 - top floor of MacQuarrie Hall. Contact information: 408.924.2910. Website: http://www.sjsu.edu/casa/ssc/. The CASA Student Success Center also provides study space and laptops for checkout.

FSS Peer Mentors

The Forensic Science Students Peer Mentor Center is located on the 5th floor of MacQuarrie Hall. The purpose of the FSS Peer Mentor Group is to provide a forum to assist forensic science students in navigating the major, understanding requirements and prerequisites, and making wise choices in their college careers. FSS Peer Mentors may also offer limited tutoring, and facilitate educational and professional opportunities. Peer Mentor services are free and available to active members of the FSS. These services may be offered in Spring 2017. Please contact sjsu.fss@gmail.com for more information.

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., read ing 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.

FS 160 DNA and Crime, Fall 2019 Course Schedule and Assignments

Tentative course calendar including assignment due dates, exam dates, date of final exam; subject to change with fair notice

NOTE that University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading."

Course Schedule

Please read the course schedule. Note: **Assignments each week are due by 1159pm on the next Monday (allowing for holidays) as designated below in the schedule by email** to sblee999@gmail.com. So for example, Assignments 1a and 1b that appear below in the 08/26/19 row are due by 1159pm on 09/09/19. Assignments 2a, 2b and 2c are due by 09/16/19, Assignment 3 that appears in the row 09/16/19 is due on 09/23/19 etc.

Week	Date	Topics, Readings, Assignments, Deadlines – all assignments due at 11:59pm, the next Monday of the following week by email to sblee999@gmail.com	CLO/ MLO
1	08/26	Course Overview and History of DNA- Reading Butler CH 1, CH 3 Assignment 1a: ***http://www.nij.gov/training/Pages/training-detail.aspx?itemid=65 and*** Assignment 1b: http://www.sjsu.edu/people/steven.lee/courses/c2/s1/DNA_Sample_Handling%2 01.pdf	***CLO 1 / MLO 1.1, 1.2***
2	09/02	**Labor Day Holiday- No classes**	
3	09/09	**Basics of Physical and Biological Evidence**- Reading Butler CH 4 **Additional Reading** Assignment 2a: http://www.profiling.org/journal/vol1_no1/jbp_ed_january2000_1-1.html Assignment 2b: http://www.sjsu.edu/people/steven.lee/courses/c2/s2/Laboratory%20Orientation%20and%20Testing%20of%20Body%20Fluids%20and%20Tissues%20for%20 Forensic%20Analysts.pdf and Assignment 2c: http://www.sjsu.edu/people/steven.lee/courses/c2/s1/S01-Crime%20Scene%20and%20DNA%20Basics%20for%20Forensic%20Analysts	CLO 1/ MLO 1.1, 1.2, 1.3
4	09/16	**Basics of Biological Evidence Screening and DNA Analysis**- Butler CH 2 and 3 Assignment 3a: http://www.sjsu.edu/people/steven.lee/courses/c2/s2/DNA%20Extraction%20and%20Quantitation%20for%20Forensic%20Analysts.pdf	***CLO 1 and 2 MLO 1.3***

5	09/23	**Introduction to DNA and Methods: DNA Extraction Read** CH 5 Assignment 3b- Lee 2017. Forensic DNA Extraction. Chapter in the Encyclopedia of Analytical Chemistry In press. To be posted.	***CLO 3 MLO 1.4, MLO 1.5, 1.6***
6	09/30	Introduction to DNA and Methods: DNA quantification – Reading CH 6 and Assignment 4: Lee, Buel and McCord 2014. Forensic DNA Quantification. A Review Electrophoresis - To be posted Prepare and study for quiz 1	***CLO 3 and CLO 4*** ***MLO 1.4, 1.5 and 1.6***
7	10/07	DNA extraction and quantification continued: CH 6 and Forensic DNA Quantification review of Lee et al. Electrophoresis article. Assignment 5: qPCR reading(s)- To be posted **Quiz 1** Study for Exam	***CLO 1-4*** ***MLO 1.4, 1.5 and 1.6***
8	10/14	Exam 1 and Introduction to RFLP and PCR – Reading CH 7 and Assignment 6a: http://www.sjsu.edu/people/steven.lee/courses/c2/s2/DNA%20Amplification%20for%20Forensic%20Analysts.pdf **Exam 1**	***CLO1-4 MLO 1.1-1.6***
9	10/21	Introduction to RFLP and PCR continued- Reading CH 7 and Assignment 6a: http://www.sjsu.edu/people/steven.lee/courses/c2/s2/DNA%20Amplification%20for%20Forensic%20Analysts.pdf	***CLO 3 and CLO 4 MLO 2.1***
10	10/28	**Introduction to PCR continued and STRs continued**- Reading CH 8 Assignment 6b: http://www.sjsu.edu/people/steven.lee/courses/c2/s2/Jobling%20and%20Gill%20 2005.pd	***CLO 3 and CLO 4 / MLO 2.1 and 2.2***
11	11/04	**STR separation and detection** Reading CH 9 and Assignment 7: http://www.sjsu.edu/people/steven.lee/courses/c2/s2/separation%20course.pdf https://www.promega.com/-/media/files/promega-worldwide/north-america/promega-us/webinars-and-events/2014/ce_based-dna-analysis-webinar.pdf?la=en	***CLO 4 MLO 2.2***
12	11/11	***No class Veteran's Day Holiday***	
13	11/18	STR genotyping and data analysis CH 10 and Assignment 8: http://www.sjsu.edu/people/steven.lee/courses/c2/s2/STR%20Data%20Analysis%20and%20Interpretation%20for%20Forensic%20Analysts.pdf	***CLO 4 MLO 2.2, 2.3 and 2.4***
14	11/25	STR interpretation and forensic issues CH 14 and Assignment 9: http://www.cstl.nist.gov/strbase/pub_pres/2_STR_Artifacts.pdf	***CLO 4 MLO 2.3, 2.4 and 2.5a***

15	12/02	Statistical Interpretation: Evaluating the Strength of Forensic DNA Evidence simple and complex samples- Probabilistic Genotyping Reading CH 11 Assignment 10: Readings to be posted and Bieber et al 2016 To be posted Also optional see OSAC, PCAST, NAS and NRC reports ***Study for Quiz***	***CLO 4 and 5*** ***MLO 2.3, 2.4 and 2.5a and 2.5b***
16	12/09	DNA Databases, cold hits, CODIS/SWGDAM and Future of DNA- Next Generation Sequencing and Applications- CH 12 and CH 15 Additional DNA loci and the Future of DNA analysis- Forensic DNA in Human Rights Investigations- Rapid DNA and Next Generation Sequencing – Phenotype, Age, and more Profiling, mRNA and Epigenetic Tissue Typing Assignment 11: Hares et al. 2014 To be posted. Assignment 12: Aboud et al 2012, Borsting and Morling 2016, Kayser et al 2016, Lee et al. 2016- To be posted **Quiz 2** **Study for Final CH 1-15, all web links and references above**	***CLO 4 and 5*** ***MLO 2.5b, and 2.6***
	12/12	**FINAL Exam 2 scheduled for 12/12/19 on line**	

NOTE: Additional assignments may also be provided during the semester.

Instructor Brief Bio

Professor Lee holds a BS from SUNY Binghamton in Biology, MS from NYU and PhD from University of California, Berkeley in Molecular Biology. Lee is currently Professor of Justice Studies at SJSU. Lee has held multiple leadership positions including scientific director and consulting appointments for several biotech companies including Illumina Inc., is a Visiting Scholar at UC Berkeley, and holds a professor appointment in the International Forensic Research Institute at Florida International University and in Biological Sciences at San Francisco State 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, directed the development, validation and implementation of new technologies and, and devised and conducted advanced DNA training courses. He is a full member of the American Association for the Advancement of Science, the California Association of Criminalists, a Fellow of the Criminalistics Division of the American Academy of Forensic Sciences 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 forensic DNA Typing of STRs at FIU (2