San José State University
Department of Justice Studies
Special Topics in Forensic Science - DNA and Crime (Seminar)
FS 160: Course Number 46645, Section 81, Fall 2020

Course and Contact Information

Instructor:	Dr. Steven Lee
Office Location:	MH 528. On line for appointments set by email.
Telephone:	408-924-2048 (office) 510-882-9036 (cell) Best way to contact me is by email.
Email:	steven.lee@sjsu.edu
Office Hours:	**Fridays 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:	**Our course meets entirely on line, asynchronously, on Canvas.** You will have assignments, readings, videos, discussions, and deadlines with all being posted on the Canvas site and the majority due on Fridays by 11:59 pm. Classes, quizzes and exams are all delivered on line by recorder lectures, email, canvas and other distance learning modalities. Powerpoints as web recordings are available each week. Email, Canvas and Zoom capable computer or laptops are required. Official class day is Fridays. First class will be held on line Friday August 21st , 2020.
Classroom:	The course website: https://sjsu.instructure.com/courses/1376195 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: 16 October 2020 and 16 December 2020** You must be available to take these two on line exams. Two **scheduled quizzes will also be delivered on line September 18th and November 13th**. 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

My faculty webpage can be seen here: https://www.sjsu.edu/justicestudies/our-department/faculty-and-staff/lee-s/index.html. Many of the readings and assignments are on the JS 185 DNA and Crime course subpage here: https://www.sjsu.edu/people/steven.lee/courses/c2/. **The majority of course materials** such as syllabus, handouts, notes, assignment instructions, readings, videos etc. **can be found on the canvas website**. The course is also being actively updated on canvas. You are responsible for regularly checking with your email and canvas announcements 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: https://nij.ojp.gov/nij-hosted-online-training-courses

2. President's Council of Advisors on Science and Technology (2016) Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods. https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf

3. National Academy of Sciences. (2009) Strengthening Forensic Sciences in the US: A Path Forward. https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf

4. NIST STRBase:
   https://strbase.nist.gov//index.htm

5. The Organization of Scientific Area Committees for Forensic Science: Biological Methods and DNA Area Subcommittees: https://www.nist.gov/topics/organization-scientific-area-committees-forensic-science/biological-methods-subcommittee

6. NCJRS publications - https://www.ncjrs.gov/
   https://nij.ojp.gov/topics/forensics/forensic-dna

7. Next Generation Sequencing in Forensic DNA- https://strbase.nist.gov/pub_pres/GIS_NGS_Intro_2015_Vallone.pdf
   https://www.illumina.com/areas-of-interest/forensic-genomics.html

8. Genetic Witness: Forensic Uses of DNA Testing, Office of Technology Assessment; https://ota.fas.org/reports/9021.pdf

9. Glossary of Forensic DNA terminology: https://strbase.nist.gov/training/Glossary-Forensic-DNA-Terms.pdf
   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

Monday, Nyle Email: Nyle.Monday@sjsu.edu

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 16 October. The final will be provided to you on line December 16th . 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 September 18th and November 13th . 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/

See the university policy S16-9 at http://www.sjsu.edu/senate/docs/S16-9.pdf Make sure to review these university policies and resources.

College of Social Science ACCESS Center

The Academic Counseling Center for Excellence in the Social Sciences provides General Education advising for undergraduate students majoring or intending to major in any of the departments in the College of Social Sciences (CoSS). We are committed to helping you develop a clear path to graduation and supporting your academic success. ACCESS is advising virtually only. Please schedule your advising appointment using the link below.

https://docs.google.com/forms/d/e/1FAIpQLSclyuz3m0jkyy1glDoRRclIA79bD2m87alPe_ZJ5KrW0sNn9A/viewform

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.

FS 160 DNA and Crime, Fall 2020 Course Schedule and Assignments

Course Schedule - *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."

Assignments: Please read the course schedule. Note: **Assignments each week, reading and/or written summaries of articles, are due by 1159pm on Fridays as designated below in the schedule by uploading to Canvas.** So for example, Assignments 1a and 1b that appear below in the 08/21/20 row are due by 1159pm on 08/28/20. Assignments 2a, 2b and 2c are due by 09/04/10, Assignment 3 that appears in the row 09/04/20 is due on 09/11/20 etc. **Note for 5 reading assignments, a written summary is required: Assignments 1b, 3b, 4, 6a and 8.**

Week	Date	Topics, Readings, Assignments, Deadlines – all assignments due at 11:59pm, the next Friday of the following week by uploading to Canvas	CLO/ MLO
1	08/21	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*** ***(Visit and view this course)*** Assignment 1b: https://www.cacnews.org/training/DNA_Sample_Handling.pdf - ***Written Summary Due 08/28***	***CLO 1 / MLO 1.1, 1.2***
2	08/28	**Basics of Physical and Biological Evidence**- Reading Butler CH 4 **Reading and Courses to Take:** Assignment 2a: http://www.profiling.org/journal/vol1_no1/jbp_ed_january2000_1-1.html Assignment 2b: https://nij.ojp.gov/events/laboratory-orientation-and-testing-body-fluids-and-tissues and Assignment 2c: https://nij.ojp.gov/events/crime-scene-and-dna-basics	CLO 1/ MLO 1.1, 1.2, 1.3
3	09/04	**Basics of Biological Evidence Screening and DNA Analysis**- Butler CH 2 and 3 Assignment 3a: https://nij.ojp.gov/events/dna-extraction-and-quantitation	***CLO 1 and 2 MLO 1.3***

4	09/11	**Introduction to DNA and Methods: DNA Extraction Read** CH 5 **Assignment 3b-** Lee 2017. Forensic DNA Extraction. Chapter in the Encyclopedia of Analytical Chemistry Posted on Canvas- **Written Summary due 09/18** **Prepare and study for quiz 1**	***CLO 3 MLO 1.4, MLO 1.5, 1.6***
5	09/18	Introduction to DNA and Methods: DNA quantification – Reading CH 6 and **Assignment 4:** Lee, Buel and McCord 2014. Forensic DNA Quantification. A Review Electrophoresis - Posted **Written Summary due 09/25** **QUIZ 1**	***CLO 3 and CLO 4*** ***MLO 1.4, 1.5 and 1.6***
6	09/25	DNA extraction and quantification continued: CH 6 and Forensic DNA Quantification review of Lee et al. Electrophoresis article. Assignment 5: qPCR reading(s)- Posted	***CLO 1-4*** ***MLO 1.4, 1.5 and 1.6***
7	10/02	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 or https://nij.ojp.gov/events/dna-amplification) **Written Summary due 10/09** Study for Exam 1	***CLO1-4 MLO 1.1-1.6***
8	10/09	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***
9	10/16	**Introduction to PCR continued and STRs continued-** Reading CH 8 Assignment 6b: https://www.sjsu.edu/people/steven.lee/courses/c2/s2/Jobling%20and%20Gill%202005.pdf **Exam 1**	***CLO 3 and CLO 4 / MLO 2.1 and 2.2***
10	10/23	**STR separation and detection** Reading CH 9 and Assignment 7: http://www.sjsu.edu/people/steven.lee/courses/c2/s2/separation%20course.pdf **Watch pt 1- slides 1-34** 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***
11	10/30	STR separation and detection **Watch pt 2- slides 35-78** https://www.promega.com/-/media/files/promega-worldwide/north-america/promega-us/webinars-and-events/2014/ce_based-dna-analysis-webinar.pdf?la=en	
12	11/06	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 **Written Summary due 11/13 Study for Quiz**	***CLO 4 MLO 2.2, 2.3 and 2.4***
13	11/13	STR interpretation and forensic issues CH 14 and Assignment 9: http://www.cstl.nist.gov/strbase/pub_pres/2_STR_Artifacts.pdf **QUIZ 2**	***CLO 4 MLO 2.3, 2.4 and 2.5a***

14	11/20 Note no class on 11/27	Statistical Interpretation: Evaluating the Strength of Forensic DNA Evidence simple and complex samples- Probabilistic Genotyping Reading CH 11 **Assignment 10:** Readings posted - Bieber et al 2016 and OSAC, PCAST reports https://sjsu.instructure.com/courses/1376195/assignments/5425327	***CLO 4 and 5*** ***MLO 2.3, 2.4 and 2.5a and 2.5b***
15	12/04 Note our last class	DNA Databases, cold hits, CODIS/SWGDAM and Future of DNA- Next Generation Sequencing and Applications- CH 12 and CH 15 Additional DNA loci /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, **McCord et al 2019**- To be posted **Study for Final CH 1-15, all web links and references above**	***CLO 4 and 5*** ***MLO 2.5b, and 2.6***
	12/16	**FINAL Exam 2 scheduled for 12/16/2020 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