

San José State University
Department of Justice Studies
FS167, Forensic Molecular Biology, Spring 2022

Contact Information

Instructor:	Jeremiah Scott Garrido, Criminalist (Forensic Biology Unit /Crime Scene Response)
Email:	jeremiah.garrido@sjsu.edu
Office Hours:	Monday & Tuesday 8pm-9pm (Or by appointment) In-person or via <u>Zoom</u>
Class Days/Time*:	Monday (Lec) - In-Person @ 6pm Tuesday (Lab) - In-Person @ 6pm <i>*All meetings via zoom until 02/11</i>
Classroom:	HB 207 / Zoom Link (https://sjsu.zoom.us/j/87405090068)
Prerequisites:	Bio 1A, Chem 1A, Chem 1 B: all with C or Better.

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. will distributed weekly via email or MySJSU. You are responsible for regularly checking with the messaging system through MySJSU (or other communication system as indicated by the instructor) to learn any updates.

Course Description

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. Prerequisites: Bio 1A, Chem 1A, Chem 1 B: all with C or Better.

Course Goals and Learning Objectives

Course Learning Outcomes (CLO)

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

- CLO1. Demonstrate an understanding of how to identify and sample biological evidence for DNA analysis – including the importance of evidence collection at the crime scene and how surfaces, materials and sources relate to sampling strategies – refresher on screening the biological evidence for source attribution
- CLO2. Explain the scientific principles behind DNA analysis techniques (DNA extraction, quantification, instrument analysis, analysis of STRs and Y STRs data, and the statistical assessment of both types of DNA profiles)
- CLO3. Apply the DNA analysis protocols, how to use the forms for each type of analysis, and how to write consultation reports that reflect test findings
- CLO4. Demonstrate an understanding of the laboratory techniques for conducting confirmatory testing and DNA analysis
- CLO5. Demonstrate how forensic DNA testimony is given at the deposition level
- CLO6. Explain how a forensic DNA laboratory functions, including the accreditation requirements

Texts/Readings

Textbooks

(Required) Advanced Topics in Forensic DNA Typing: Methodology. Butler, J.M.. (2012). 10.1016/C2011-0-04189-3. ISBN-13: 978-0123749994 / ISBN-10: 0123749999.

(Recommended as a Resource) Fundamentals of Forensic DNA Typing. John Butler 2010. ISBN 9780123749994. Academic Press (This is an older textbook that is a companion of the textbook required for this class. *Although not required, this will be very useful to consult for several topics – Your instructor will provide resources for this textbook – including power points via email and/or Canvas*). If you plan for a career in Forensic DNA Analysis, I highly recommend retaining as a reference.

Forensic Biology Laboratory Protocols. Crime laboratory protocols (publicly available). Protocols will be handed out and utilized for exercises.

Additional reading and Internet materials:

Outlines, Journal articles and other readings will be accessible at the SJSU library, on reserve or will be accessible online. Citations and URLs for online materials will be provided in assignments and on the greensheet.

Library Liaison

Dr. Nyle Monday. Phone: (408) 808-2041 Email: Nyle.Monday@sjsu.edu

Course Requirements and Assignments

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. (LO1, LO2, LO3, LO4, LO5 and LO6)

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. (LO1, LO2, LO3, LO4, LO5 and LO6)

Simulated/Online Laboratory Assignments/Reports - 50 points:

Interactive online exercises will be held throughout the semester. These will emphasize: Proper collection methods, Microscopy/Presumptive tests, DNA Extractions, Quantification of DNA, multiplex PCR amplification of STRs (autosomal and Y), capillary electrophoresis, computer Short Tandem Repeats (STR) data analysis, and moot court testimony. Written reports for each of the activities will be required (see general guidelines for reports below). Participation will also be considered in the grades. (LO2, LO3, LO4).

Guidelines for Laboratory Reports (See Laboratory Template):

All lab reports must in the format of the template provided via email and canvas. 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.

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:

- Are all case notes taken contemporaneously?
- 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 laboratory casefile?
- 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:

- 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)?

Grading:

Quizzes/Activities	100 points;
Exam 1	100 points;
Exam 2 (Paper /Writing Assignment)	50 points;
Laboratory casefiles	100 points;
Final exam	150 points;
Total required	500 points.

Grading Policies:

Make-up exams will not generally be permitted. However, under extraordinary circumstances, with proper documentation and approval by the instructor, an alternate assignment may be provided.

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
< 383.4	F

This course must be passed with a C or better as a CSU graduation requirement.

Classroom Protocol

Proper Zoom etiquette and participation are expected. You will be evaluated in part based upon your contributions to class discussions. It is essential that you come prepared to participate so keep up with the reading and plan to speak up. Attendance is imperative for success in this class.

University Policies

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](http://www.sjsu.edu/provost/services/academic_calendars/) at http://www.sjsu.edu/provost/services/academic_calendars/. The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

Consent for Recording of Class and Public Sharing of Instructor Material

[University Policy S12-7](http://www.sjsu.edu/senate/docs/S12-7.pdf), <http://www.sjsu.edu/senate/docs/S12-7.pdf>, requires students to obtain instructor's permission to record the course.

- “Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.”
 - It is suggested that the greensheet include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
 - In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- “Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.”

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy S07-2](http://www.sjsu.edu/senate/docs/S07-2.pdf) at <http://www.sjsu.edu/senate/docs/S07-2.pdf> 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 [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available 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 your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Integrity Policy S07-2 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](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](http://www.sjsu.edu/aec) (AEC) at <http://www.sjsu.edu/aec> to establish a record of their disability.

In 2013, the Disability Resource Center changed its name to be known as the Accessible Education Center, to incorporate a philosophy of accessible education for students with disabilities. The new name change reflects the broad scope of attention and support to SJSU students with disabilities and the University's continued advocacy and commitment to increasing accessibility and inclusivity on campus.

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

Computer labs for student use are available in the [Academic Success Center](http://www.sjsu.edu/at/asc/) at <http://www.sjsu.edu/at/asc/> located on the 1st floor of Clark Hall and in the Associated Students Lab 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 DV and HD digital camcorders; digital still cameras; video, slide and overhead projectors; DVD, CD, and audiotape players; sound systems, wireless microphones, projection screens and monitors.

SJSU Peer Connections

Peer Connections, a campus-wide resource for mentoring and tutoring, strives to inspire students to develop their potential as independent learners while they learn to successfully navigate through their university experience. You are encouraged to take advantage of their services which include course-content based tutoring, enhanced study and time management skills, more effective critical thinking strategies, decision making and problem-solving abilities, and campus resource referrals.

In addition to offering small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Workshops are offered on a wide variety of topics including preparing for the Writing Skills Test (WST), improving your learning and memory, alleviating procrastination, surviving your first semester at SJSU, and other related topics. A computer lab and study space are also available for student use in Room 600 of Student Services Center (SSC).

Peer Connections is located in three locations: SSC, Room 600 (10th Street Garage on the corner of 10th and San Fernando Street), at the 1st floor entrance of Clark Hall, and in the Living Learning Center (LLC) in Campus Village Housing Building B. Visit [Peer Connections website](http://peerconnections.sjsu.edu) at <http://peerconnections.sjsu.edu> for more information.

SJSU Writing Center

The SJSU Writing Center is located in Clark Hall, Suite 126. All Writing Specialists have gone through a rigorous hiring process, and they are well trained to assist all students at all levels within all disciplines to become better writers. In addition to one-on-one tutoring services, the Writing Center also offers workshops every semester on a variety of writing topics. To make an appointment or to refer to the numerous online resources offered through the Writing Center, visit the [Writing Center website](http://www.sjsu.edu/writingcenter) at <http://www.sjsu.edu/writingcenter>. For additional resources and updated information, follow the Writing Center on Twitter and become a fan of the SJSU Writing Center on Facebook. (Note: You need to have QR Reader to scan this code.)



SJSU Counseling Services

The SJSU Counseling Services is located on the corner of 7th Street and San Fernando Street, in Room 201, Administration Building. Professional psychologists, social workers, and counselors are available to provide consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or learn more information, visit [Counseling Services website](http://www.sjsu.edu/counseling) at <http://www.sjsu.edu/counseling>.

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.

Learning Assistance Resource Center

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>.

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. 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., 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.

FS167 Forensic Molecular Biology (Lec/Lab), Spring 2022 Tentative Course Schedule

(this will change fair notice)

Week/Date		Lecture	Laboratory (<i>day after lecture</i>)
1	31-Jan	"We've Come A Long Way" Overview of Forensic DNA typing and History of Forensic DNA – Outline(s) by Instructor	Lab: Laboratory Orientation - Set up small student groups.
2	7-Feb	<i>Intro Continued:</i> "We've Come A Long Way" The Role of the Crime Laboratory in a Criminal Investigation / Overview of Forensic DNA typing and History of Forensic DNA – Chapter 1 Butler / Outline(s) by Instructor	DNA at the Crime Scene - Exercise Part I (detection/collection/expectation of DNA typing results)
3	14-Feb	<i>Forensic Biology / From the Crime Scene to the Crime Laboratory PART I-</i> Introduction to Biological/Physical Evidence. Common Types of Biological Evidence in Criminal and Civil Cases-Locard's Exchange Principle- Class vs Individual Characteristics Chapter 1 Butler / Outline(s) by Instructor	DNA at the Crime Scene - Exercise Part II (detection/collection/expectation of DNA typing results)
4	21-Feb	<i>Forensic Biology / From the Crime Scene to the Crime Laboratory PART II - Forensic Methods / Techniques to Characterize Biological Material - Introduction to Detection, Screening and Evidence/Sample Collection methods.</i> Chapter 1 Butler / Outline(s) by Instructor	PC 187 (Homicide) Case: Documenting / Screening / Examination of Bloodstain Evidence [Bloodstain Patterns/Presumptive Test for Bloodstains]
5	28-Feb	PART I – Principles of Molecular Biology - Prokaryotic and eukaryotic genome structure and function; Interrelationship of DNA, RNA, and protein synthesis; Transcription, translation, replication Chromosomes, Genes and Forensic DNA markers DNA Biology- The Scientific Basis for DNA typing. Resources / Outline(s) by Instructor	PC 187 (Homicide) Case: Documenting / Screening / Examination of Bloodstain Evidence [Bloodstain Patterns/Presumptive Test for Bloodstains]
6	7-Mar	PART II - Principles of Molecular Biology- Biochemistry of DNA and Human Genetics. Gene expression and regulation; Recombinant DNA techniques Chromosomes, Genes and Forensic DNA markers - The Scientific Basis for DNA typing. Resources / Outline(s) by Instructor	PC 187 (Homicide) Case: DNA Results/Interpretation (Single Source)
7	14-Mar	PART II Continued - Principles of Molecular Biology, Biochemistry of DNA and Human Genetics. Gene expression and regulation; Recombinant DNA techniques and Sequencing; Chromosomes, Genes and Forensic DNA markers - The Scientific Basis for DNA typing. Resources / Outline(s) by Instructor EXAM REVIEW	Examining Evidence with IR Imaging/ Alternate Light Source / Presumptive and Confirmatory Tests for Seminal Fluid
8	21-Mar	Exam 1: Covering Lectures/Outlines/ Terms provided/Butler Chapters 1 and 5 and Outlines	PC 261 (Sexual Assault) Case Assignment / Journal Article Review on Probabilistic Genotyping
9	28-Mar	Spring Recess - No Class	Spring Recess - No Lab
10	4-Apr	DNA Extraction Methods and Quality Assurance and Validation – (Butler chapters 2 and 7)	<i>PC 261 Case Evidence and Reference Sample Screening</i> (ALS, Presumptive, Confirmatory Test & Sample Selection)
11	11-Apr	DNA Quantitation (Butler chapter 3)	DNA Extraction: Sexual assault case samples
12	18-Apr	Week 1 - PCR Amplification/ Short Tandem Repeat (STR) Loci and kits / Y-Chromosome DNA Testing – Butler chapters 4, 5 and 13	DNA Quantitation: Sexual assault case samples
13	25-Apr	Week 2- PCR Amplification/ Short Tandem Repeat (STR) Loci and kits / Y-Chromosome DNA Testing – Butler chapters 4, 5 and 13 Journal Article Review Due (TEST 2)	PCR STR DNA lab: Amplification of Sexual Assault Case Samples
14	2-May	Capillary Electrophoresis: Principles and Instrumentation (Butler chapter 6)	STR Detection/Interpretation: Typing results will be distributed for interpretation.
15	9-May	DNA STR Interpretation, Low-Level DNA Testing, Statistics/Expert Systems (Resources / Outline(s) by Instructor - Butler Chapters 11 and 17)	Preliminary DNA Report Due / Mock Court Testimony/ Presentation of results
16	16-May	Review for final (Last day of instruction)	No Lab
FINAL EXAM May 23rd from - 5:15pm to 7:30pm			