FORS 5440
Forensic Biology
Spring Semester 2018

PROFESSOR:	Bobby LaRue, PhD
OFFICE:	222
TELEPHONE:	936-294-3202
E-MAIL:	bobby.larue@shsu.edu
CLASS HOURS:	Tues & Thursdays 9-10:30 am , Labs; Tues 11-3 pm
CLASSROOM:	CFS 102 and 219
OFFICE HOURS:	Wednesdays noon – 5pm (or by appointment)

REQUIRED TEXTBOOKS

Fundamentals of Forensic DNA Typing by John Butler. Academic Press. 2010.

SUGGESTED TEXTBOOKS

a) Advanced Topics in Forensic DNA Typing: Methodology by John Butler. Academic Press. 2012

b) Advanced Topics in Forensic DNA Typing: Interpretation by John Butler. Academic Press. 2014

COURSE DESCRIPTION

This course will cover the theoretical basis and practical DNA analysis of biological evidence. Different extraction and quantification methods will be discussed as well as techniques for minimal amounts of DNA, degraded and inhibited samples, strategies for the analysis of PCR products (STRs), interpretation of results, biostatistics and quality assurance procedures. Basic statistical genetics theory will be approached to learn how to generate a final DNA report.

An advanced knowledge of the scientific literature and the ability to integrate molecular biology into practical applications and research is required. During the course, students will develop independent learning skills and improve their ability to present complex scientific information orally and in written form.

Academic Community Engagement:
This course is designated as an Academic Community Engagement (ACE) experience because students will be able to apply theoretical concepts in practical settings, reflect on their experience, and provide service through their engagement with local schools.

In this course, you will not only learn knowledge and skills, but also actively use them to make a difference in our community. This experience, it is hoped, will help you see yourself as a positive force in this world and deepen your understanding of your role as a citizen.

COURSE OBJECTIVES

1. Master the criteria used to decide which extraction technique should be used depending on the type of biological evidence.
2. Be proficient in performing and interpreting confirmatory tests for biological evidence.
3. Be able to accurately quantify the amount of DNA in a biological sample using real-time PCR methods.
4. Assess the level of PCR inhibition and DNA degradation of a biological sample using real-time PCR methods.
5. Interpret profile results obtained from PCR-fluorescent method analysis.
6. Understand the principles of forensic DNA tissue profiling.
7. Understand basic principles of probability and population genetics to apply in statistical calculations to generate the report to be defended in court.
8. Master the use of the software necessary to generate reports and interpret results.
9. Complete a laboratory-based proficiency test involving the examination of forensic DNA evidence.
10. Demonstrate integration of knowledge and skills in forensic science by developing complete resource packages for conducting a forensic DNA experiment in high school and/or junior high science classes.
11. Students will demonstrate their ability to transfer knowledge to others by designing and conducting a scientific laboratory experiment and lesson within a local high school or junior high science class.
12. Broaden student's scope of understanding in the field of forensic science.
13. Professional growth and development through formal interaction with forensic science personnel and students in an educational setting.

Course objectives 10 - 13 are linked to the Academic Community Engagement component.

Class Schedules (NB. Class schedule is subject to change as required)

Lectures

Week	Week Starting	Lecture
1	15th Jan	Introduction & Overview & History of DNA typing
2	22nd Jan	Presumptive testing - alternate methods
		DNA extraction
3	29th Jan	PCR
4	5th Feb	DNA Quantification
5	12th Feb	Biology of STRs
		STR genotyping issues
6	20th Feb	**AAFS MEETING**
7	26th Feb	DNA Separation & Detection methods
		DNA Amplification kits
8	5th March	**Mid-Semester Exam**
		Instrumentation
9	12th March	**SPRING RECESS**
10	19th March	Forensic Issues – PCR inhibition & DNA degradation
		Forensic Issues – LCN
11	26th March	Forensic Issues – contamination & mixtures
		Basic genetic principles
12	2nd April	Basic statistics & probability
		Y Chromosome testing
13	9th April	STR population databases
14	16th April	ACE Presentations
15	23rd April	Profile frequency estimates

16	30th April	Kinship and parentage
		DNA and DVI
	7th May	EXAMS

Laboratory Classes

Week	Week Starting	Lab Task 1	Lab Task 2
1	15th Jan	No Lab	
2	22nd Jan	Lecture - Sample Collection, Presumptive testing & Tissue Profiling Webinar	
3	29th Jan	Biological Screening	
4	5th Feb	DNA Extraction 1 - Organic extraction	DNA Quantification
5	12th Feb	DNA Extraction 2 - Chelex and Silica (Qiagen)	DNA Quantification
6	19th Feb	**AAFS MEETING**	
7	26th Feb	DNA Extraction 3 - Hair, nails, chewing gum & cigarette butts	DNA Quantification
8	5th March	Dilutions, STR amplification, Capillary Electrophoresis & EPG Interpretation	
9	12th March	**SPRING RECESS**	
10	19th March	Multiplex qPCR - Inhibition and Degradation (Innoquant)	STR amplification & CE (degraded & inhibited samples)
11	26st March	DNA Extraction 4 - Differential Extraction	DNA Quantification
12	2nd April	Y-STR amplification - Powerplex Y	STR amplification - GlobalFiler
13	9th April	Mixed samples and Y-STR data interpretation	
14	16th April	ACE Presentations	
15	23rd April	**Proficiency Test I**	
16	30th April	**Proficiency Test II**	
	7th May	EXAMS	

Attendance policy

Attendance will be recorded in keeping with University policy. Students are expected to attend class. Class attendance requirements will be followed in accordance with Academic Policy Statement 800401. In accordance with university policy, students will not be penalized for absences of up to three hours as long as examinations and other assigned work have not been missed. If a student is absent it is their responsibility to obtain the class material and remain current with information distributed during class. Occasionally changes in schedule may be announced in class. *These changes apply to all students, even those who were absent from class.* One letter grade may, at the discretion of the instructor, be deducted from students' final grade if they miss more than four classes. There will be no distinctions between "excused" and "unexcused" absences. Students are expected to be on time to class. After the beginning of the class, late students may be counted as absent.

This course meets and exceeds ACE requirement of students dedicating at least 12 hours of engagement for the four (4) semester credits.

Grading Policy

Final grades will be based upon the following scale: 90 plus average an "A"; 80 to 89 a "B"; 70 to 79 a "C"; and below 70 an "F". Students should not count on a curve of the final grade. The instructor reserves the right to modify the grading scheme to accommodate for a missed test or final examination in extenuating circumstances.

The instructor reserves the right to assign a final exam grade of 0% should he/she deem the absence was not properly handled or was unjustified. Appeals will be handled in accord with University Policy Statement 900823, Academic Grievance Procedures for Students.

Make-up exams

If a student is absent from the laboratory or mid-term exam he/she may not be given an opportunity to make up the laboratory exercise or mid-term exam, even if prior notice has been given the instructor. No make-ups will be given for the final exam unless arrangements have been made prior to the exam date. It is the student's responsibility to monitor the accuracy of the grades.

COURSE REQUIREMENTS

Examinations and Assignments

There will be one formative mid-semester quiz/activity, and one mid-semester test.

The final examination is *comprehensive* and may be based upon any information from anytime during the course. The written final examination will be composed of multiple choice questions, true-false questions, fill in the blank questions, and/or short answer questions. The final examination and tests may be composed of any combination of the aforementioned question types or may be composed of only two or three of the question types.

In addition to the written examination there will be a final laboratory-based proficiency test. This proficiency test will consist in the analysis of one of various types of forensic DNA evidence. Students will be required to apply their acquired knowledge to process this evidence and analyze it using techniques that are widely accepted by the scientific community.

Assignments will consist of two lab reports and an ACE project:

Lab reports will summarize data produced in the lab classes and address pertinent questions. Successful completion of the lab reports will require the student to apply advanced knowledge acquired in class to forensic laboratory techniques. Assignments are due as per notification via Blackboard. The instructor reserves the right to refuse late work, but will make reasonable accommodations for students who experience unfortunate circumstances.

Students will present an ACE project. This assignment will be completed in groups of three or four. Students will develop resources required to conduct a class experiment within a high school and/or junior high science class. This will involve a work sheet for students and a complete resource package for instructors. All members of the group will receive the same grade. However, 25% of the available grade for this project will consist of a peer-review evaluation to ensure all members contribute equally. Further instructions and marking criteria will be provided in class.

Assessment	Scope	Timeframe	Weight of Grade
Mid-Term Quiz	Defined	Week 5	10%
Lab Report 1	Defined	Lab Week 8	5%
Lab Report 2	Defined	Lab Week 10	10%
Mid-Semester Exam	Defined	Lecture Week 8	15%
ACE Placement	Comprehensive	Week 14	15%

Stats Quiz	Defined	Week 16	5%
Lab Proficiency Test	Comprehensive	Weeks 15 & 16	15%
Final Examination	Comprehensive	9-11am, 8th May	25%

Material for the final examination and exams may come from class material, supplemental reading material or class discussion that was not covered in the reading material. Furthermore, special instructions and guidance on exam material may be disseminated during class time. *In other words, attendance and active participation in class is extremely important in order to complete the course successfully and receive a good grade.*

Deadlines for assignments, lab reports and other important announcements such as test times and locations will be announced both in class and on Blackboard. As a result, students *must* read their SHSU email and monitor their Blackboard accounts regularly in order to remain current.

Academic dishonesty
http://www.shsu.edu/administrative/faculty/sectionb.html#dishonesty

Disabled student policy
http://www.shsu.edu/~vaf_www/aps/811006.html

Services for disabled students
http://www.shsu.edu/~counsel/sswd.html

Student absences on religious holy day policy
http://www.shsu.edu/catalog/scholasticrequirements.html#holyday

Use of Cell & Smart Phones, PDA's & Similar Devices: Engaging in voice communication using a cell phone or similar communication device during class is prohibited. Leaving the classroom to receive a phone call is prohibited, except with prior approval of the instructor for urgent communications. Device sound alerts should be turned off during class. Engaging in text communication during class is discouraged, although non-disruptive occasional use is permitted. Persistent or extended texting is, however, not allowed. Per University policy communication using any electronic device during an in-class examination is prohibited.