



BIOT 6340

DNA Forensics

Credit Hours: 3

Semester: Spring **Year:** 2023
Class Day/Time: Wed 9:00 A – 12:00 P **Class Location:** BMR 113

Instructor of Record: Amy Tvinnereim

Office: BMR Lab B2
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Office Hours: M 8-9 am & W 8-9 am or by appointment

Course Description: DNA Forensics will provide students an understanding of the science of DNA analysis in criminal investigation. Students will gain an understanding of the history of forensic DNA analysis, sample collection and storage, DNA extraction, quantitation, amplification and separation, STR marker analysis, analysis of non-autosomal DNA including mitochondrial DNA, Y-chromosome DNA, and X-chromosome DNA and interpretation of data.

Prerequisite: As per program admission

Co-requisite: None

Goals of Course:

Course Objectives:

1. Understand the history of forensic DNA analysis
2. Describe process of sample collection and storage
3. Understand techniques used to extract, quantitate, amplify and separate DNA for analysis
4. Understand STR analysis of DNA and the interpretation of STR data
5. Understand analysis of non-autosomal DNA such a mitochondrial DNA, Y-chromosome DNA and X-chromosome DNA.
6. Understand the use of DNA analysis in missing person and disaster victim identification.
7. Explain problems associated with samples with low DNA levels and samples with more than one source of DNA.

Student Learning Outcomes (SLO or “course objectives”):

1. The student will be able to explain the techniques used to obtain DNA samples and proper storage of the samples.
2. The student will be able to explain the techniques used to extract, quantitate, amplify and separate DNA from forensic samples.
3. The student will be able to explain the techniques used to analyze and interpret forensic DNA sample data.
4. The student will be able to explain the analysis of non-autosomal DNA samples.
5. The student will be able to explain the use of DNA analysis in missing person and disaster victim identification.
6. The student will be able to explain problems associated with working with forensic DNA samples that have low levels of DNA present or have mixtures of DNA present.

Course Assessment/Methods of Evaluation:

The student’s understanding will be evaluated with comprehensive take home exams and participation in discussions in class. Exams will consist of short answer questions covering material from the textbook and from the lecture material.

- Exam I (50%)
- Exam II (50%).

Grading

Grades will be based on the following scale

A - 90 - 100%

B - 80 - 89

C - 70 - 79

D - 60 - 69

Any grade below a D is failing. Any grade below a B is unacceptable for graduate school and may be considered an academic deficit.

Assignments

Students are expected to turn in assignments on time. Late assignments will be handled as follows:

1 day late	5% deducted from overall assignment grade
2 - 3 days late	10% deducted from overall assignment grade
4 -7 days late	20% deducted from overall assignment grade
7-14 days late	30% deducted from overall assignment grade
14+ days late	No credit will be given for the assignment

Linked Program Learning Outcomes:

The student learning outcomes listed above address the following Biotechnology Program PLOs:

- PLO5 - The student will explain the principles, mechanisms, and interrelatedness of both in vivo and in vitro biochemical, molecular biological, and genetic processes.

Textbook:

Advanced Topics in Forensic DNA Typing: Methodology, John M. Butler, Academic Press; ISBN 978-0-12-374513-2

Advanced Topics in Forensic DNA Typing: Interpretation, John M. Butler, Academic Press; ISBN 978-0-12-405213-0

Course Content:

- History of DNA Typing
- Sample Collection and Storage
- DNA Extraction and Quantitation
- PCR Amplification
- Short Tandem Repeats and Capillary Electrophoresis
- Quality Assurance and Validation
- DNA data bases: Uses and Issues
- Missing persons/Disaster victim identification
- Degraded DNA
- Low level DNA Testing
- Single Nucleotide polymorphisms
- Kinship analysis
- Y chromosome DNA testing
- Mitochondrial DNA Analysis
- X-Chromosome Analysis
- Non-human DNA
- Legal Aspects of DNA Testing

- Data Interpretation
- Statistics and Probability
- Population Data and Match probability calculations
- Mixture statistics

Other Class Policies

Attendance:

Regular or punctual attendance is expected. If a student misses a class or lab, the student is responsible for obtaining any information distributed during those times. Make-ups are possible only under certain instances (labs cannot be made up). Arrangements for any make-ups and/or missed labs should be discussed directly with the instructor for that day's class.

Academic Honesty:

Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

Cheating

Dishonesty of any kind involving examinations, assignments, alteration of records, wrongful possession of examinations, and unpermitted submission of duplicate papers for multiple classes or unauthorized use of keys to examinations is considered cheating. Cheating includes but is not limited to:

- Using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class.
- Falsifying or inventing any information, including citations, on an assigned exercise.
- Helping or attempting to help another in an act of cheating or plagiarism.

Plagiarism

Plagiarism is presenting the words or ideas of another person as if they were your own. Materials, even ideas, borrowed from others necessitate full and complete acknowledgment of the original authors. Offering the work of another as one's own is plagiarism and is unacceptable in the academic community. A lack of adequate recognition constitutes plagiarism, whether it utilizes a few sentences, whole paragraphs, articles, books, audio-visual materials, or even the writing of a fellow student. In addition, the presentation of material gathered, assembled or formatted by others as one's own is also plagiarism. Because the university takes such misconduct very seriously, the student is urged to carefully read university policies on Misconduct in Research and Other Scholarly Activity 05.00. Examples of plagiarism are:

- Submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another.
- Submitting a work that has been purchased or otherwise obtained from an Internet source or another source.
- Incorporating the words or ideas of an author into one's paper without giving the author due credit.

Adding/Dropping:

The official deadline for adding and dropping courses is as published in the academic calendar ([Registrar Withdrawal webpage](#)). However, students are strongly encouraged to meet with their graduate advisor or the Program Coordinator prior to adding/dropping courses. Movement into and out of classes after the 4th class day requires approval of the Program Director. Each student is responsible for their own enrollment status with the university.

Disability Accommodations:

UT Tyler HSC abides by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act, which mandate reasonable accommodations be provided for students with documented disabilities. If you have a disability and may require some type of instructional and/or examination accommodations, please contact me early in the semester so that I can provide or facilitate provision of accommodations you may need. If you have not already done so, you will need to register with the Student Services Office (located on the main campus). You may call 903-566-7079 for more information.

Program:	Master of Science in Biotechnology
Degree:	MS
Department:	Cellular and Molecular Biology
School:	Medical Biological Sciences
Course:	BIOT6340 – DNA Forensics

Area	Marketable Skill*
SKILLS	Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
	Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
	Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
ABILITIES	Written Comprehension — The ability to read and understand information and ideas presented in writing.
	Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
	Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
WORK ACTIVITIES	Updating and Using Relevant Knowledge — Keeping up-to-date technically and applying new knowledge to your job.
	Getting Information — Observing, receiving, and otherwise obtaining information from all relevant sources.

*All marketable skills listed for this course and program were drawn from the Knowledge, Skills, and Abilities identified by the US Department of Labor and Statistics for “Biological Technicians” and “Molecular and Cellular Biologists” as published on O*Net Online (www.onetonline.org)