

# Forensic Molecular Biology/4590/Section 001

## Instructor Information

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## Course Description, Structure, and Objectives

Meets in-person on Tuesdays from 3:00PM - 4:50PM in AUID 201.

This course focuses on examination of physical evidence in criminal matters for biological materials; primarily as it relates to human identity testing. Lectures and exercises include screening of evidence for biological material for DNA testing, DNA extraction techniques, DNA quantification, PCR amplification of polymorphic nuclear, and fragment analysis utilizing capillary electrophoresis, and emerging and advanced technologies.

The course consists of weekly lectures *in-person* that integrate with concurrent enrollment in the hands-on Lab (4590.301 or 302). Students *must* have completed BIOL/BIOC 4570 or its equivalent; concurrent enrollment is permitted with prior approval of the instructor. Students should understand the basics of human genetics, molecular biology, biochemistry, and population genetics prior to enrolling in this course.

Upon successful completion of this course, students will have been introduced to essential aspects of biological evidence and applied molecular biology techniques from the crime scene to the courtroom. This course will focus on practical knowledge and application in order to prepare students for a career in forensic biology/DNA. Students will learn:

- Biological evidence collection, preservation, and storage within a multi-disciplinary framework;
- Methodology and Technology;
- Data Analysis, Evaluation, Interpretation, and Statistical Models;
- Communicating complex scientific information and findings;
- Human Factors and Ethics in Forensic Science;
- Laboratory Quality Assurance requirements.

### Subject matter warning

***By the nature of its intersection with the criminal justice system, the material covered in this course will necessitate the use of graphic imagery and discussion of difficult subject matter such as, but not limited to, homicide, sexual assault, and violent crimes against persons, children, and/or animals. Students are forewarned that frank discussion of the details of such incidents is paramount in discovering potential biological evidence for forensic testing and is an integral part of a career in forensic science. Students are encouraged to support each other, be mindful of their classmates, and bring any concerns they have to the instructor immediately. The instructor is available by email, during office hours, or by appointment.***

## Required/Recommended\* Materials

This course does not have a specific textbook. Materials below are recommended as supplemental resources.

- Textbooks\*

Forensic Serology

1st Edition - September 17, 2025, Shanan S. Tobe

Fundamentals of Forensic DNA Typing

1st Edition - August 20, 2009, John Butler

Advanced Topics in Forensic DNA Typing: Methodology\*

1st Edition - July 21, 2011, John Butler

Advanced Topics in Forensic DNA Typing: Interpretation\*

1st Edition - July 28, 2014, John Butler

- ***Materials uploaded onto Canvas for reading supplement lecture content. It is strongly recommended that you read this material as it will be part of the examinations.***
- Additional course materials will be made available in Canvas during the semester.
- Supplementary materials and/or readings will be provided through individual learning modules as needed. Students will be expected to use library resources to read current forensic science literature.
- Technology requirements for courses with digital materials:

This course has digital components. To fully participate in this class, students will need internet access to reference content on the Canvas Learning Management System. Students will need access to webcam and microphone for optional remote delivery of material if in-person classes are not possible due to inclement weather, etc. Exams/Assignments may require the use of computer/device during class time. If circumstances change, you will be informed of other technical needs to access course content. Information on how to be successful in a digital learning environment can be found at [Learn Anywhere](https://online.unt.edu/learn) (<https://online.unt.edu/learn>).

## How to Succeed in this Course

### Assessment of competencies

Students will be provided with foundational principles of forensic molecular biology and related topics and expected to apply this knowledge in assignments and examinations. These will mimic as closely as possible the types of assessments students will encounter in a professional forensic laboratory setting.

### Assignments

When provided, assignments are designed to supplement lecture material and to assist students in synthesizing the information for practical applications. It is in the best interest of the student to complete the assignments. Material covered by the assignments will not be covered in detail in lecture and will be included in the examinations.

### Attendance

If a student has a legitimate reason for an absence, this should be communicated with the instructor **prior** to the absence, whenever possible. University excused absence must be communicated in advance in writing to the instructor. Absences due to illness should be communicated as soon as possible depending on the nature of the illness; official documentation from a medical professional must be provided within one business week after return to class. ***Students are responsible for material covered in the lectures whether or not they attend class.***

Research has shown that students who attend class are more likely to be successful. You should attend every class unless you have a university excused absence such as active military service, a religious holy day, or an official university function as stated in the Student Attendance and Authorized Absences Policy (PDF)([https://policy.unt.edu/sites/default/files/06.039\\_StudAttnandAuthAbsence.Pub2\\_.19.pdf](https://policy.unt.edu/sites/default/files/06.039_StudAttnandAuthAbsence.Pub2_.19.pdf)).

*Absence for Religious Holidays:* (<http://www.unt.edu/catalog/undergrad/enrollment.htm>): A student absent due to the observance of a religious holiday may take examinations/complete assignments scheduled for the day(s) missed within a reasonable time after the absence. Class participants must notify the instructor, in writing, of planned absences for religious holidays by the 12th day of the beginning of the class.

*Participation in University Sponsored Activities:* such as athletics, debate, musical organizations, AFROTC, class field trips, etc., must be authorized by the student's academic dean. Within three days after the absence, students must obtain authorized absence cards from the Dean of Students for presentation to their instructors.

*Absence for Military Service:* In accordance with section 51.9111 of the Texas Education Code, a student is excused from attending classes or engaging in other required activities, including exams, if he or she is called to active military service of a reasonably brief duration. The maximum time for which the student may be excused has been defined by the Texas Higher Education Coordinating Board as “no more than 25 percent of the total number of class meetings or the contact hour equivalent (not including the final examination period) for the specific course or courses in which the student is currently enrolled at the beginning of the period of active military service.” The student will be allowed a reasonable time after the absence to complete assignments and take exams. Policies affecting students who withdraw from the University for Military Service is given in the Withdrawal section.

It is important for all of us to be mindful of the health and safety of everyone in our community. If you are not feeling well and may be contagious – SHARING IS NOT CARING; please stay home. Please contact me if you are unable to attend class because you are ill.

### ADA accommodation

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodation at any time; however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members can ask students to discuss such letters during their office hours to protect the student's privacy. For additional information, refer to the [Office of Disability Access](http://www.unt.edu/oda) website (<http://www.unt.edu/oda>). You may also contact ODA by phone at (940) 565-4323. A student needing accommodation can connect with the [Office of Disability Access](https://studentaffairs.unt.edu/office-disability-access) to begin the registering process (<https://studentaffairs.unt.edu/office-disability-access>).

## Communication

Active discussion in the classroom and on Canvas is encouraged. Interactions with your fellow students and the instructors enrich the learning experience. Opportunities will be available throughout the course for extensive interaction. Active participation is essential to success.

Students may also connect with the instructor through Canvas email and/or by attending office hours. During busy times, email becomes full, so if a response is not forthcoming within two business days, please send a follow up email. A gentle nudge is always appreciated. Office hours offer an opportunity to ask for clarification or find support with understanding class material. Additional office hours, in person and virtually, will be offered as the semester concludes. Your success is our goal.

*Communication through Canvas messaging is preferred over direct email for any communication related to the course.*

## Successful Learning Environment

The classroom culture relies on open communication and mutual respect of all perspectives. All discussions should be respectful and civil. Although disagreements and debates are encouraged, personal attacks are unacceptable.

Every student in this class should have the right to learn and engage within an environment of respect and courtesy from others. Please review UNT's student code of conduct so that we can all start with the same baseline civility understanding (Code of Student Conduct) (<https://deanofstudents.unt.edu/conduct>).

Prohibition of Discrimination, Harassment, and Retaliation (Policy 16.004) The University of North Texas (UNT) prohibits discrimination and harassment because of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law in its application and admission processes; educational programs and activities; employment policies, procedures, and processes; and university facilities.

The University takes active measures to prevent such conduct and investigates and takes remedial action when appropriate. Acceptable Student Behavior Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT's Code of Student Conduct (Links to an external site.) (<https://deanofstudents.unt.edu/conduct>) to learn more. Student Evaluation Administration Dates Student feedback is important and an essential part of participation in this course.

## Course Requirements/Schedule\*

| <b>Week</b> | <b>Topic</b>                                                                                                                                                      | <b>Associated Lab</b>                                                                                                                                          |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Week 1      | Course Introduction; Role of the Forensic Scientist; Human Factors                                                                                                | Lab Introduction; Ethics assignment; Pipetting Exercise                                                                                                        |
| Week 2      | Evidence collection, preservation, storage; Evidence Examination for body fluids and other biological material; Serological testing                               | Ethics Assignment Discussion; Case Assignments                                                                                                                 |
| Week 3      |                                                                                                                                                                   | Evidence examination; Body Fluids (weeks 3-5)<br>Week 5 – Peer review and turn in Case Files for check 1.                                                      |
| Week 4      |                                                                                                                                                                   |                                                                                                                                                                |
| Week 5      |                                                                                                                                                                   |                                                                                                                                                                |
| Week 6      | <i>DNA Analysis: Extraction to Quantification/ Normalisation</i>                                                                                                  | <i>DNA Analysis (weeks 6-9)</i>                                                                                                                                |
| Week 7      |                                                                                                                                                                   |                                                                                                                                                                |
| Week 8      |                                                                                                                                                                   |                                                                                                                                                                |
| Week 9      | Spring Break                                                                                                                                                      |                                                                                                                                                                |
| Week 10     | <i>Midterm Exam (in-class), 300 points</i>                                                                                                                        |                                                                                                                                                                |
| Week 11     | Midterm Exam Discussion;<br>DNA Analysis: Separation, Data evaluation, interpretation, statistics, Communicating scientific information (reporting and testimony) | <i>Data evaluation, interpretation, statistics, forensic comparisons, report writing Final reports, case file completion.<br/>Peer reviews and corrections</i> |
| Week 12     |                                                                                                                                                                   | <i>Final lab reports and case files due.</i>                                                                                                                   |
| Week 13     | Lineage markers, DNA databases; Technology integration and Emerging Technologies                                                                                  | <i>Report corrections.</i>                                                                                                                                     |
| Week 14     |                                                                                                                                                                   | <i>Mock Court Preparation (week 13)</i>                                                                                                                        |
| Week 15     |                                                                                                                                                                   |                                                                                                                                                                |
| Week 16     | Overflow /Review                                                                                                                                                  | <i>Mock Court</i>                                                                                                                                              |
| Week 17     | <i>Final Exam (in-person), Tuesday, May 5, 12:30 p.m. to 2:30 p.m. (time/location to be confirmed)</i>                                                            |                                                                                                                                                                |

\*Approximate schedule, subject to change. Students will be notified during class or through Canvas of adjustments to the schedule. Students will be notified by Eagle Alert if there is a campus closing that will impact a class and describe that the calendar is subject to change, citing the [Emergency Notifications and Procedures Policy \(PDF\)](https://policy.unt.edu/sites/default/files/06.049_Standard%20Syllabus%20Policy%20Statements_supplement.pdf) ([https://policy.unt.edu/sites/default/files/06.049\\_Standard%20Syllabus%20Policy%20Statements\\_supplement.pdf](https://policy.unt.edu/sites/default/files/06.049_Standard%20Syllabus%20Policy%20Statements_supplement.pdf)).

## Assessing Your Work

### Grading

Grades are based on total points earned. *Grades are not determined by percentage.* Canvas's built-in grade calculations should not be used as a basis for assessing your current standing in the course.

A = 900-1000

B = 800-899

C = 700-799

D = 600-699

F = 500-599

Lecture: max 600 points

- Written Examinations: Mid-term, 300 points; comprehensive final, 300 points.

Grades are based on full understanding of the material; examinations are an objective measure of this understanding. Exams will not be graded on curves as this represents a subjective assessment.

Examinations test your ability to APPLY the information in real-world scenarios.

If you have a University approved absence that conflicts with a scheduled exam, you are responsible for scheduling to take the exam **in advance**. There will not be any make-up examinations offered.

Grade appeals for individual assignments and examinations must be requested in writing within 7 days from the date the grade was posted.

Final grade is a combination of lecture (600 points) and laboratory (400 points). Please refer to the laboratory syllabus for a breakdown of point values for the lab modules.

### Academic Integrity

There is a **ZERO-TOLERANCE** policy in this course for violations of the Academic Integrity Policy. The nature of forensic science is such that any violation signifies an egregious ethical breach that is unacceptable in the field and it would be unconscionable to allow such a person to practice forensic science.

According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University.

Unless otherwise indicated, work independently at all times; do not look at or copy the work of another student, former or current. Do not allow another student, current or future, to look at or copy your work. You are responsible for ensuring computer files related to coursework are password protected. Do not submit written work that is identical or highly similar to websites or published works. Do not submit written work without citing the source of all information. Do not submit written work generated by artificial intelligence (e.g., Chat GPT).

## Other Policies and Information

### Generative Artificial Intelligence (AI)

**Definition:** “Generative Artificial Intelligence (AI) is a system of algorithms or computer processes that can create novel output in text, images or other media based on user prompts. These systems are created by programmers who train them on large sets of data. The AI learns by finding patterns in the data and can then provide novel outputs to users' queries based on its findings.

Generative AI systems are distinguished from other AI systems by their ability to create novel output. For example, predictive AI systems on smartphones can suggest a short, common response to an email by analyzing the text received and drawing from a pool of common responses. Generative AI systems like ChatGPT, which employs a Large Language Model, go a step further to provide new information for users based on their questions or requests.

Text based generative AI systems are based on large language models, which are huge probabilistic algorithms for drawing upon a corpus of text to predict likely sequences of words. Other generative AI systems may be based on images or sounds as well.” <https://www.nlm.gov/guides/data-thesaurus/generative-artificial-intelligence>

**Limited Use** is permitted in this course (Lecture and Laboratory).

- Specifically, you may use GenAI to assist in general information about course related topics, help finding **legitimate** scientific resources, and tools such as Grammarly to improve the clarity of your writing.
- Any use must be cited – which GenAI and for what purpose.

### Cautions

- GenAI's have not been specifically trained in the complexities of forensic science. They recognize patterns from large sets of data, but this data has not been verified – meaning the response might be correct but it could range from inaccurate to incorrect. There is a tremendous amount of information available through internet sources; it does not follow that all this information is correct. You must critically evaluate AI's response and verify veracity.
- [Recent peer-reviewed research](#) recognizes the value of GenAI as a tool. They have also recognized ethical implications. **For our learning environment, the studies have identified negative cognitive effects: diminished decision-making and critical thinking. Both are essential skills in forensic science. Use it at your own risk, understand the positive and negative aspects.**

### Student Evaluation of Instruction

The student evaluation of instruction is a requirement for all organized classes at UNT. The survey will be made available during weeks 13, 14 and 15 of the long semesters to provide students with an opportunity to evaluate how this course is taught. Students will receive an email from "UNT SPOT Course Evaluations via IASystem Notification" (no-reply@iasystem.org) with the survey link. Students should look for the email in their UNT email inbox. Simply click on the link and complete the survey. Once students complete the survey, they will receive a confirmation email. For additional information, please visit the SPOT website (Links to an external site.) (<http://spot.unt.edu/>) or email [spot@unt.edu](mailto:spot@unt.edu).

### Sexual Assault Prevention

UNT is committed to providing a safe learning environment free of all forms of sexual misconduct, including sexual harassment sexual assault, domestic violence, dating violence, and stalking. Federal laws (Title IX and the Violence Against Women Act) and UNT policies prohibit discrimination on the basis of sex, and therefore prohibit sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking, and/or sexual assault, there are campus resources available to provide support and assistance. UNT's Survivor Advocates

can assist a student who has been impacted by violence by filing protective orders, completing crime victim's compensation applications, contacting professors for absences related to an assault, working with housing to facilitate a room change where appropriate, and connecting students to other resources available both on and off campus. The Survivor Advocates can be reached at [SurvivorAdvocate@unt.edu](mailto:SurvivorAdvocate@unt.edu) or by calling the Dean of Students Office at 940-565- 2648. Additionally, alleged sexual misconduct can be non-confidentially reported to the Title IX Coordinator at [oeo@unt.edu](mailto:oeo@unt.edu) or at (940) 565 2759.