

FRSC 610-001 Forensic Serology
SC 3323, Tuesdays 12:30-3:20pm

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Email is preferred method of communication

Student hours: Tuesday/Thursday 9:30-10:45 am and by appointment

Catalog Description:

Instruction and laboratory practice in identifying body fluids and body fluid stains using various biochemical, instrumental, microscopic and electrophoretic methods to determine their possible origin and species prior to forensic DNA analysis. Blood spatter pattern recognition will be described and used in determining the most probative samples for study at the crime scene and on evidence samples to undergo analysis. Four hours of lecture/laboratory per week.

Objective:

Students will gain valuable hands-on experience making solutions and performing dilutions, testing serology reagents on body fluids and evaluating methods from papers. For a mock crime scene case, students will evaluate, plan perform, interpret and report on serological tests as applied to crime scene and on evidence collected from crime scenes and analyzed in a forensic laboratory. Students will develop their research, writing and presentation skills, through written lab reports, a research paper, an in-class presentation, and a mock trial.

Required Text:

Li, Richard. Forensic Biology, 2nd ed. CRC Press, Boca Raton, FL, 2015. ISBN-13: 978-1-4398-8970-1. (Link provided)

Other Readings from the Scientific Literature (e.g. peer-reviewed journal articles from *Analytical Chemistry*, *Science and Justice*, *Forensic Medicine*, *Science and Pathology*, *Forensic Science International*, *FSI-Genetics*, *Journal of Forensic Sciences*, *International Journal of Legal Medicine*, etc.) will be provided via Blackboard

Safety:

Students are required to take the following safety course: <https://towsonehs-md.safecolleges.com/courses/details/C823733C-388B-11EF-B2E6-DBA861D7C2DA?splash=0>

Upon completion of the safety course, the student must upload the certificate to blackboard prior to starting the laboratory component.

Dress code: Long pants/ ankle length skirts and closed-toed shoes that cover the top and back of the foot are required. Any student wearing shorts, shorter than ankle length skirts or open-toed shoes will be denied permission to work in the laboratory and will not obtain the full participation grade for the semester.

Food: Food and drinks, including water, are not permitted in the laboratory at any time. Any food or drink found in the laboratory will be immediately discarded. Please keep all food and drink in the hallway on the table provided.

Tentative Schedule:

Date	Topic
8/26	Intro to the course, syllabus, Chemical and Biological Safety, Biological Evidence concepts and sources of body fluids, evidence collection and storage.
9/2	Locating collecting and packaging biological evidence at the crime scene ALS, Reagent and solution preparation, pipetting, Serial dilutions
9/9	Blood evidence concepts and testing: Components, Chemical Tests and reactions, lab testing, antibodies and blood grouping, ELISA, QA/QC
9/16	Semen Evidence Concepts and Testing: Components, Chemical Tests and Reactions, Lab Testing, Sperm morphology
9/23	Saliva Evidence concepts and testing: Components, Chemical Tests and Reactions, Lab Testing
9/30	Hair Evidence Concepts and Testing: Composition, Morphology, Microscopy, Human v. Animal Distinctions.
10/7	Preparation of Mock Case work Samples
10/14	MIDTERM -Take Home exam, no course meeting (due 10/21 at 11:59 PM)
10/21	Emerging Serology Technologies Paper topic with links to three papers Mock Crime Scene Evidence Testing
10/28	Annotated Bibliography due Report Writing for Serology Mock Crime Scene Evidence Testing
11/4	Research Paper due Expert testimony in Serology Mock Crime Scene Evidence Testing
11/11	Mock Case Serology Reports due Blood Spatter, Bloody fingerprints and other impression evidence
11/18	MOCK TRIALS
11/25	Presentation of emerging technologies in Serology papers
12/2	Lab Notebook Due
12/9	FINAL Exam Monday 12/9/25 3-5 pm.

Assessment: (1000 points total) 5% deduction for each late submission

- 100 points Attendance and class participation
- 50 points Lab Notebook
- 50 points Annotated Bibliography
- 100 points Mock Case Data and Report
- 100 points Mock Trial Testimony
- 100 points Research paper on Emerging Technology
- 100 points Presentation of research topic
- 200 points Midterm Exam
- 200 points Final Exam

Assignment of grades will be based on the standard graduate scale:

A	930 points or above
A-	900-929 points
B+	870-899 points
B	830-869 points
C	700-829 points
F	699 or less

Attendance and class participation (100 points): Attendance and participation in activities, proper attire for lab and other activities

Lab Notebook (50 points): Notebook outlining serological testing steps, recipes lot numbers, limit of detection

Mock Case (100 points): Students will develop a mock serological case containing ten evidence items to be tested. Materials will be provided to the student. Students will then be assigned a case to analyze and complete proper worksheets, notes and final written report. All discoverable materials will be turned in for use in the Mock trial.

Mock Trial (100 points): Students will testify as an expert witness, with *voir dire*, about the facts of the case, with the instructor acting as the prosecutor and the defense attorney. These will be individually scheduled with instructor.

Annotated Bibliography for the Research Paper (50 points):

Select one of the following emerging technologies, or another as approved by the instructor:

Spectroscopic (IR, Raman, Fluorescent, near IR) testing for body fluids,

DNA or RNA (mRNA, miRNA, SiRNA, etc.) methods for the differentiating body fluids

Novel Chemical methods (NGS, ELISA, new color tests) for the detection of one or more body fluids

Compile an Annotated Bibliography of relevant sources for the research paper to include background/theory/procedure/testing/etc. that encompass relevant topics to the emerging technology and current accepted method that we used in class. This bibliography is expected to have a minimum of 10 peer-reviewed articles formatted per the Journal of Forensic Science author guidelines. For each source, provide a paragraph summarizing the paper and describing the relevance to your research- include the objectives of the study, specific methods and conclusions.

Research Paper on Emerging Technology (100 points): The research paper should be 8-10 double-spaced pages, including appropriate tables. Tabulate/Compare and contrast the emerging method you chose and an older, accepted method we used in class in terms of: method name, date of first use, theory of how the method works including chemical reaction, protocol or procedure to prepare reagents, protocol or procedure for test, positive/negative result color or data, sensitivity, cost, case or simulated case use, and future research. Also explain what changes and improvements have been made since it was first proposed and implemented.

Indicate which you would adopt if you were a lab director and why. It is expected that the sources from your annotated bibliography will be included in the paper and as such should be added to the reference section of your paper and included at the bottom of the appropriate presentation slides in the PowerPoint presentation (see below). A minimum of ten peer-reviewed journal articles must be used and the references should be in the format of *Journal of Forensic Sciences*.

(<https://onlinelibrary.wiley.com/page/journal/15564029/homepage/forauthors.html>)

A grading rubric for the papers will be provided.

Presentation: (100 points): A 15 minute presentation of paper/topic on emerging technology in PowerPoint to the class based upon paper topic. A grading rubric for the presentation will be provided.

Midterm (200 points): The midterm will be a take-home exam. You will have one week to complete the exam. You may use your notes, books, websites and journal articles. Reference all information. You may not get help from another person. The exam must be your own work in accordance with the TU Academic Integrity policy. No make-up exams except if directed by university due to exceptional circumstances.

Final Exam (200 points): Cumulative essay exam during the final exam period. The exam must be your own work in accordance with the TU Academic Integrity policy. No make-up exams except if directed by university due to exceptional circumstances.

Chemistry Department Statement on Classroom Diversity and Inclusion The students, faculty, and staff at Towson University represent a diverse and vibrant community of learners and scholars. As a community, we value the unique contributions of each individual and promote active participation in all aspects of the learning process by each community member. Your instructor supports Towson University's goal of fostering a diverse and inclusive educational setting. Your instructor strives to create a classroom environment built upon the principles of mutual respect and support. Toward this end, all members participating in this course are expected to demonstrate respect for all other members of the class. If you feel these expectations have not been met, please speak with your instructor or the designated diversity liaison, Dr. Cindy Zeller (czeller@towson.edu) or Dr. Ryan Casey (rcasey@towson.edu). For further information regarding the diversity and inclusion policies of Towson University, please see Towson University's "Strategy 1: Exposure to Diversity", the Fisher College of Science and Mathematics Diversity Action Plan, and the Chemistry Department Diversity Action Plan.

Students with Disabilities: This course follows Towson University policies for students with disabilities. Students with disabilities are encouraged to register with Accessibility and Disability Services (ADS), 7720 York Road, Suite 232, <https://www.towson.edu/accessibility-disability-services/>, 410-704- 2638 (Voice) or 410-704-4423 (TDD). Students who expect that they have a disability but do not have documentation are encouraged to contact ADS for advice on how to obtain appropriate evaluation. A memo from ADS authorizing your accommodation is needed before any accommodation can be made.

Laboratory Policy for Pregnant Students Pregnant students should consult their physicians for advice on whether or not to perform experiments in the laboratory. Students are encouraged to provide their physician with a list of the chemicals that they might be exposed to while in lab. They should also check the SDS sheets (available in the Department) to be aware of the hazards of the chemicals. If a student is advised against performing laboratory work, then faculty must make accommodations for the student. Any accommodations

should comprise a workload that is approximately equivalent to the regularly scheduled laboratory work. These accommodations may include: - performing “dry” experiments only, in a place free from exposure to ongoing experiments; - performing the wet chemistry at a later date; - receiving an incomplete grade in the course pending completion of experimental work

Course repeat policy: “Students may not repeat a course more than once without prior permission of the Academic Standards Committee.”

Masking Statement: Masks are optional on campus.

Chat GPT, Open AI and Internet Resources As we begin the semester, I want to remind you of the importance of academic integrity. Part of what you learn here at Towson University is how to do your work authentically and honorably, and I am here to help you do that. In my course, you will be given assignments and I will provide you with specific instructions about how to complete them. Sometimes the instructions will tell you to do the work entirely on your own without consulting other people or material, including the internet. At other times, you may be asked to work together or to use certain technology tools. If you are ever uncertain about how you should work on an assignment, please contact me.

Student Academic Integrity Policy (TU 03.01.00): The Towson University Code of Conduct prohibits "all forms of dishonesty including cheating (and) plagiarism." Plagiarism is copying the words of another or the use of ideas of another without proper citation. Plagiarism can result from copying an entire document to inappropriate paraphrasing. In order to avoid plagiarism, the use of words or ideas of another without proper citation, it is imperative to consciously think about what you have read and what you are trying to write. In scientific literature, we do not normally use direct quotes from the primary resources that we are using to gather our information. It is important to paraphrase the ideas and conclusions obtained from the primary literature and rewrite them in your own words. One method to assure that you will not plagiarize is to take notes on each of your primary resources and then write the paper based on your notes, not from the references. Your paper will summarize the works of others, not directly quote from them. If you have any questions about plagiarism and correct citations see <https://towson.libguides.com/c.php?g=815185&p=9595591> for further examples and methods to correct the problems. The consequences of cheating or plagiarism will be a failing grade of 0 points for the assignment and may result in failure of the course. Plagiarism, fabrication, falsification, cheating, complicity in academic dishonesty, abuse of academic materials, multiple submissions of the same work or part thereof for multiple courses/assignments, will not be tolerated and will result in a failing grade of 0 for that assignment and may result in failure of the course.

Reporting Hate Crimes and Bias Incidents Towson University prohibits all students, staff, and faculty from committing or engaging in any hate crimes as defined under state and federal law, or any acts of bias, hate, or prejudice exhibited in conduct that is in violation of another University policy on campus, on University property, at University sponsored events, or when engaged in University activities and business on or off campus. The University must receive notice to respond effectively to alleged Hate Crimes or Bias Incidents in the University Community. Please report or file a complaint of a Hate Crime or Bias Incident in the following ways: • Report to University Police: Towson University's Police Department (“TUPD”) will determine if incidents are criminal in nature. In cases of hate crimes, individuals can be punished with fines and/or imprisonment. Felony offenses demonstrated to be motivated by bias are subject to enhanced penalties. • Contact the Office

of Inclusion & Institutional Equity: Online at: <https://towson.edu/notattu>, email at: OIE@towson.edu, telephone, in person or via regular mail. <https://www.towson.edu/about/administration/policies/06-01-20-policy-procedures-reportinghate-crimes-bias-incidents.html>

Copyright Notice: Your instructor retains all copyrights to all original materials distributed in this course (including, but not limited to, hard copies and electronic copies of lecture slides, notes, practice problems, worksheets, assignments, lab materials, and exams). Reposting, selling, or otherwise distributing these materials in any fashion at any time is prohibited.

In Case of Emergency: In the event of a University-wide emergency course requirements deadlines and grading schemes are subject to changes that may include alternative delivery methods, alternative methods of interaction with the instructor, class materials, and/or classmates, a revised attendance policy, and a revised semester calendar and/or grading scheme. In the case of a University-wide emergency, please refer to the following about changes in this course: 1. Web Site: www.towson.edu 2. Telephone Number(s) 3. TU Text Alert System: This is a service designed to alert the Towson University community via text messages to cell phones when situations arise on campus that affect the ability of the campus to function normally. Sign up: <https://www.towson.edu/publicsafety/notification/>

Lab Fees A lab fee of \$50 is charged for this course. This fee pays for body fluid test kits, chemicals and glassware. https://www.towson.edu/provostbudgetoffice/documents/class_lab_fee_list_21_22_august_26_2021.pdf